



ACE
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DESTINIES

THE PAPERBACK MAGAZINE
OF SCIENCE FICTION & SPECULATIVE FACT

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Destinies

Edited by JAMES BAEN

THE PAPERBACK MAGAZINE
OF SCIENCE FICTION AND SPECULATIVE FACT

All NEW stories
and articles by
POUL ANDERSON
GREGORY BENFORD
ROBERT SHECKLEY
J. E. POURNELLE
FREDERIK POHL
LARRY NIVEN
BEN BOVA
AND MANY
MORE!



WELCOME

... to the second issue of *Destinies*! As promised in *Destinies* #1, our lead piece this issue is "The Ways of Love," by Poul Anderson. This issue also contains fiction by such stellar contributors as Gregory Benford, Ben Bova (no longer with *Analog*, Ben is now the Fiction Editor at *Omni*, *Destinies*' only real rival for the hearts and minds of the new generation of science fiction/fact readers), Larry Niven and Robert Sheckley. Also as promised, Spider Robinson explains how you can improve science fiction, and Frederik Pohl tells us what he wants to be when he grows up. You read it here first.

Next issue's lead will be a hot-off-the-platen novella by Larry Niven and Jerry Pournelle, complete with fabulous cover art by Dean Ellis and profuse interior illustrations of the quality you are beginning to expect from *Destinies*. Jerry's article on how to become a space colonist will appear in #3 as well—the theme ties in perfectly with the story. (This issue, "New Beginnings" focuses on the new breakthroughs in fusion.) The feature guest article will be by G. Harry Stine, on the military implications of the Third Industrial Revolution. And of course Poul Anderson will continue his examination of science and science fiction.

See you then!

The Editor

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Destinies



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THE WAYS OF LOVE

by Poul Anderson



I could not love thee half so much...

Ten of their years before, we had seen that being come through the transporter into our ship and die. This day we stood waiting upon his world, and as we waited, we remembered.

The *Fleetwing* was bound for Prime of that constellation for which she was named. She would not—will not—arrive there for many lifetimes, though already she had fared, at more than half the speed of light, while Arvel swung six hundred and twelve orbits around Sarnir. So deep is the universe. She was, indeed, the farthest out of all our ships, and Rero-and-I reckoned it an honor when we were assigned a term of service within her.

Not that we expected anything spectacular. Rather, it should be the opposite. Until the starcraft reach their goals, they are doing little but patiently traveling. A change of crew is almost like a casual rite. You and your mate go to the mattercasting station on Irjelan. The pair whom you are to relieve come back and inform you of conditions aboard. That seldom takes long and, as a rule, is done at ease, above a brazier of smokeleaf in the elders' lounge. (Yet you see Arvel shining green among the stars, over this scarred face of her outer moon, and feel what your duty will mean.) Soon you two give

the others a farewell twining of tendrils and make your way to the appropriate sender unit. The flash of energy which scans and disintegrates your bodies, atom by atom, you do not feel; it goes too swiftly, as fast as the modulated tachyonic beam which then leaps across the light-years. At the end, the patterns which are you are rebuilt in new atoms, and there you are for the next ninety-six days.

You do maintenance, perhaps minor repair; you record scientific observations and perhaps program new ones; you might start the engine for a course correction, though rarely when the target sun is still remote, none of it takes much effort. Your true job is to stand by against improbable emergencies. Sometimes a vessel in transit gets used as a relay station by a couple or a party bound for too distant a world to make it in a single jump. Then they stop for a short visit. This would happen in *Fleetwing*, she being on our uttermost frontier and bound onward into strangeness.

Rero-and-I welcomed the isolation. Our usual work was challenging. We had been pilot and chief engineer on a series of exploratory boats in several different planetary systems, which meant assisting the teams after landing them. Perforce, we became a pair of jackleg xenologists. This in turn involved us in the proceedings of the Stellar Institute back on Arvel, its rather hectic social rounds as well as its data evaluations. We couldn't plead family needs when we would have preferred to stay home, since both our children were young adults. Nor did we want more; an infant would ground us. We enjoyed too much what we did in space. Its price was that we had too little life for ourselves.

Thus we were glad of aloneness wherein to meditate, read, watch classic choreodramas on tape, really get to know certain music and fragrances, be altogether at leisure in our lovemaking. And so it went for seven and thirty days.

Then the alarm whistled, the warning panels flashed, we hastened to the receiving chamber. As we floated waiting in free fall, I sensed how both my hearts knocked. Rero's body and mine worked to cool us down from the heat of our excitement; we hung in a mist and our odors were heady, we gripped hands and wished we could join flesh. What cause had anyone to seek us out? A messenger, telling of catastrophe?

He materialized, and we knew the disaster was not ours but his.

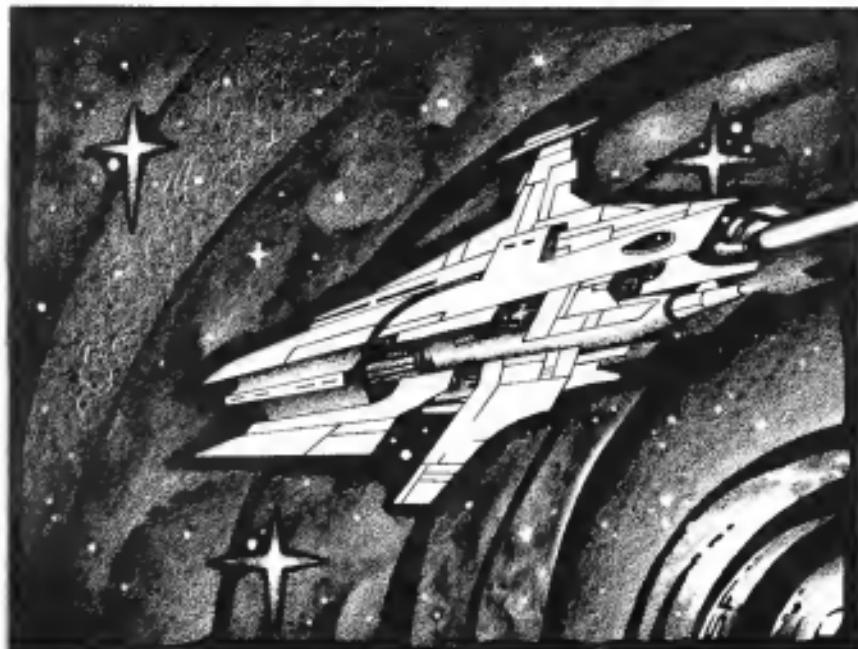
Our first shock at his appearance blent with the pain that sent us hurtling back, a-gasp. A puff of the atmosphere in his ship had come through with him. I recognized the lethal acridity of oxygen. Fortunately, there was not more than our air renewers could clean out in a hurry. Meanwhile he died, in agony, trying to breathe chlorine.

We returned to attend his drifting corpse. Silence poured in from the unseen dark, through the barren metal around us, as if to drown our spirits. We looked long upon him—not then aware that he was male, for the human genitals are as peculiar as the human psyche. His odors were salt and sour, few and simple. We wondered if that was because he was dead. (It wasn't, of course.) After we had carefully, reverently opened his soiled coverall and inner garments, we spent a while trying to see what kind of beauty might be his. He looked grotesquely like us and unlike us: also a biped, larger than Rero,

smaller than me, with five digits to a hand, no part truly resembling anything of ours. Most striking, perhaps, was the skin. Save for patches of hair and a scattering of it everywhere else, that skin was smooth, yellowish-white, devoid of color-change cells and vapor vents. I wondered how such a folk expressed themselves, their deepest feelings, to each other. (I still do.) Eeriest to me, somehow, were the eyes. He had two, the same as us, but in that tendrillless, weirdly convoluted visage their blindness glimmered white around blue . . . blue.

Rero whispered at last: "Another intelligent race. The first we've met that explores too. The very first. And this one of them had to come through to our ship unprotected, and die. How could it happen?"

I sent look and fingers along the body, as gently as might be. His aura was fading away fast. Oh, yes, I know it's only infrared radiation; I am not an Incar-



nationalist. Nevertheless, that dimming after death is like a sign of the final wayfaring. "Emaciation may be normal to the species, and the society may be careless about cleanliness," I said in my driest tone. "I doubt both, though, and suspect that here has been a terrible accident consequent upon an earlier misfortune." Meanwhile I thought the old goodbye: *God take home your soul, God shelter it in the warmth of His pouch and nourish it with the milk of Her udder, until that which was you has grown and may go free.*

Rero joined me in speculations which proved to be essentially correct. Since the truth has never become as widely known on Arvel as it should be, let me set it briefly forth.

The *Southern Cross* was likewise among the oldest and farthest-out vessels from her world. She likewise was bound for the brightest star in the constellation for which she was named, the same as we desired; humans call that sun Alpha Crucis. Like us, they use mattercasters to alternate the watches in space. This craft had chanced to pass near enough a burnt-out black dwarf that they changed her program and put her in orbit around it for scientific study. Four males went to initiate this. Unforeseen factors, chiefly the enormous magnetic field of the object, wrecked both their ion drive and their transmitter. Two of them died in the effort to make repairs. The two survivors were starving when at last they had put together a primitive 'caster. Not knowing its constants with exactness, they must vary the tuning until they got the signal of a receiving station. When they did, David Ryerson rushed impulsively through. It chanced that he had not tuned to a human-built circuit, but to ours

aboard *Fleetwing*.

Soon I warned Rero: "We must respond, and fast, before whoever is at the other end switches to a different code and we lose contact."

"Yes," she agreed. Her aura flamed with eagerness, though at the same time her touch honored the dead. "By the dawn, what a miracle! A whole race as advanced as us, but surely knowing things we don't—a whole transporter network linked to ours—O unknown friend, rejoice in your fate!"

"I'll armor myself and take the reamins along," I said. "That ought to demonstrate good will."

"What?" Her smells, vapor cloud, color-change cells gone black, showed horror. She clutched my arm till claws dug in. "Alone? Voah, no!"

I drew her to me. "It will be a gray fire to depart from you, Rero, my life, not knowing if . . . if I condemn you to widowhood thereby. Yet one of us must, and one must stay behind, to tend the ship and bear the news home if the other cannot. I think female agility won't count for much, when yonder hull isn't likely to be bigger than this, and male strength may count for a little."

She did not resist long, for in fact her common sense exceeds mine. It was only that I had to say the word first. We did not even stop to make love. But never have I seen a red more pure than was in her glance upon me when we embraced.

And so I, protected against poison, entered the transmitter and emerged on the *Southern Cross* with David Ryerson's body in my arms. His shipmate, Terangi Maclaren, received it in awe. Afterward, Rero-and-I helped him find the tuning for a station maintained by his race, and he trod across the gulf between, bearing death and glory.



—There followed the dozen years—ten of Earth's—that everyone knows about, when commissions from the two species met in neutral spots; when a few representatives sent to either planet brought home bewilderment; when meanwhile the scientists jointly hammered out sufficient knowledge that they could guess how vast was their ignorance. My wife and I were concerned in this effort, not merely because first contact had chanced to be ours, but because our prior experience with sophonts had given us a leap ahead. To be sure, those were all primitives, whereas now Arvel was dealing with a civilization that sundered the atom, rebuilt the gene, and colonized across interstellar distances. Here too, however, we were well equipped. she to seek converse with fellow pilots, I with fellow engineers.

Accordingly, when the Earthfolk, to whom ten is

a special number, decided to celebrate the decade with ceremonies, and invited Arvelan participation, it was natural that Rero-and-I go. Apart from symbolism, we might be of practical use. Thus far the two breeds had shared hardly anything except those technical endeavors. The time was overpast for agreements. Most obviously, though not exclusively: If we could combine our mattercaster webs, then we would each have access to about twice as much space as before, twice the wealth, twice as many homesites—

No, not really. In that respect, Arvel would gain less, inasmuch as the Sarnirian System has a cosmically unusual distribution of elements. Planets where photosynthesis liberates chlorine are more rare than those where it liberates oxygen, not to mention additional requirements. (My brother mariner, David Ryerson, with calcium instead of silicon in his bones. . .) Many people in our families and tribes felt ungenerous about this, wanted compensation for the difference. Meanwhile on Earth—well, that is what I wish to relate, if I am able. Certainly both sides were haunted: *How far can we trust them? They command energies which can break a world apart.*

Ostensibly present for harmless rituals, Rero-and-I meant to talk privately, informally with powerful humans, helping lay the groundwork for a conference that could arrive at a treaty. That was our plan, when eagerly we agreed to go.

It made our disappointment the fierier, after we had been on Earth for a time. And in this wise happened that we stood on a terrace waiting to be borne to a secret rendezvous.

Once a fortress in a frightful age, later remodeled

and enlarged to hold the masters of the globe, that complex called the Citadel dwells magnificently among those mountains called the Alps. From the parapet we looked down steeps and cliffs which tumbled into a valley. Beyond it the heights lifted anew, a waterfall ashine like a drawn blade, a blue-shadowed whiteness blanketing peaks, the greenish gleam of a solid mass. This is a chill planet where water often freezes, a sight which can be lovely. The sun stood close to midday in a wan heaven, its disc seeming slightly larger than that of Sarnir above Arvel but its light muted. Not only does it give off less ultraviolet, the air absorbs most of what there is. Yet Rero-and-I had learned to see beauty in soft golden-hued luminance, in a thousand shy tints across eldritch landscapes.

"I wish—" Wind boomed hollowly around Rero's voice. She broke off, for she had no real need to



speak her thought. Through the transparent seal-suit, face-tendrils and skin-language said for her how she would joy to inhale, smell, drink, taste, feel, take the wholeness of this place unto herself. Impossible, of course, unless she first hooked into a pain inhibitor; and then she would have a bare moment for the orgasm of body comprehension, before the oxygen killed her. Poor David Ryerson, had he known what awaited him he might at least have died observing, not bewildered.

I took her by the hand, glove in glove. My own desire was as strong as hers, but directed toward her. She saw that, and saucily flexed her sex organ at me . . . but the rest of her declared longing rather than humor. Imagine for yourself and your mate: the entire time you spend outside an Arvel-conditioned suite, which is most of the time, you are enveloped apart from each other!

"Do you think Tamara Ryerson will be present?" I asked, more for the talk than out of curiosity.

"Who?—Ai, yes, David Ryerson's widow," Rero said. We had met her just once, at a welcoming ceremony which included Terangi Maclarens. This was at the beginning of our visit, and no opportunity came to converse with either of them. An omen—for when had we since gotten to link minds in fullness and candor with anybody? "I'd hardly expect that." My wife paused. "Although, now you mention it, we might well try to seek her out later. What does widowhood mean to her? That could give us a clue to the whole psychology of these beings."

"I doubt that, from a single sample" I answered. "However . . . n-n-n-n . . . one sample is better than none. Maybe Vincent Indigo can arrange it." A

short, brightly-clad human came out of a doorway. "Name the Illwisher and you'll sense his heat."

My use of the proverb was figurative. Our Citadel-appointed guide, liaison, arranger, and general factotum had been tirelessly helpful. True, we soon got a feeling of being rushed from spot to spot, person to person, event to event, with never an instant free for getting acquainted. But when we complained of this to him—

"Good day, Sir Voah, Lady Rero," he said with a salute. "I'm sorry I'm late. If we're to get you away from here unbeknownst, you can't be seen leaving. A Guards officer was inspecting the area and I had to wait till he finished."

Our throatstrings could not form his kind of sounds very clearly, but a minicomputer passed our words through a transponder which corrected that. I admired the device. In spite of more experience with aliens, we Arvelans had never developed anything as good for this purpose. On their side, human members of the study group had expressed immense interest in some of our construction technology. What might our peoples not accomplish together, if they would allow themselves? "It is in order, then, on the island of Taiwan?" I asked.

Vincent Indigo nodded. "Yes, the Maclarens are ready for you. It'll be dark there and the house has big, well-shaped grounds. We can set you down and take off again afterward without being noticed. Come on, we'd better not dawdle here."

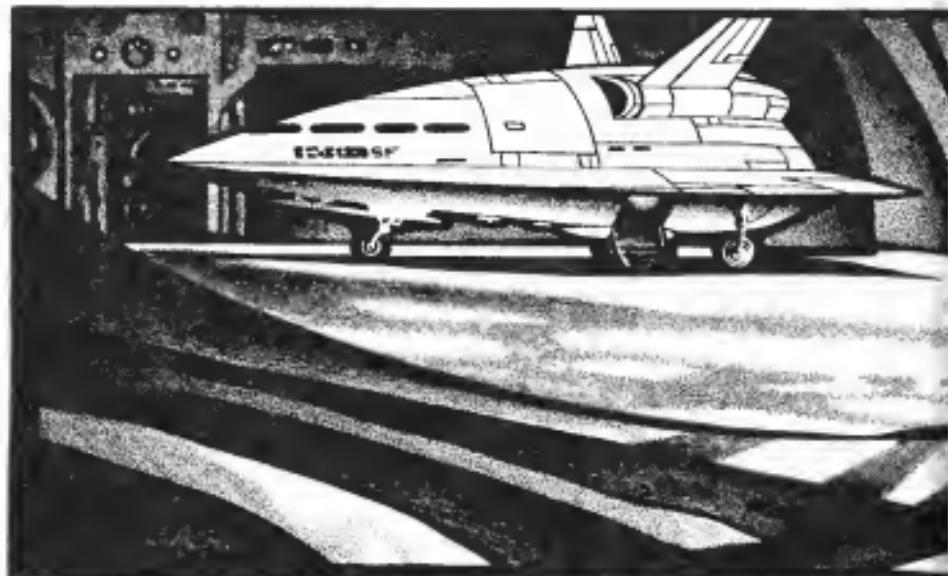
As we strode over the flagstones, I could not help trotting. This world was so full of mysteries, riddles less of nature than of the soul. "How long can we stay? You weren't certain about that."

"No, because it depended on what arrangements I could make. The idea is to get you together with him for completely free conversation—no officials around, no busybodies, no journalists. And it has to stay secret that you did, or the whole project is spoiled from the start, right? Knowing you'd be questioned about it afterward would inhibit things, no matter how well-meant the questions. Voah, my friend, you can't escape being a first-magnitude celebrity."

If you want to feel our problem, consider those few sentences. I can hardly translate the key words; you notice what archaic and foreign terms I am borrowing, in search of rough equivalents.

Officials: Not parents, not tribal elders, not Speakers for an Alliance or their executive servants—no, agents of that huge bloodless organization called a "government," which claims the right to slay whomever resists the will of its dominators. *Busybodies*: Without sanction of kinship, custom, or dire need, certain humans will still thrust themselves into affairs. *Journalists*: Professional collectors and disseminators of news recognize no bounds upon their activities except for what is imposed by the government; and is that limitation not odd in itself? *Celebrity*: Lest the foregoing make Earthfolk seem repulsive, let me say that they have a wonderful capacity for giving admiration, respect, yes, a kind of love to persons they have never met individually and to whom they have no kinship whatsoever.

I pass over the fact that Indigo addressed me alone, ignoring Rero. That might be a simple peculiarity of language, when it was I who had spoken to him.



"Twenty-four hours looks reasonable," he told me—a rotation period of the planet, slightly longer than Arvel's. "The Protector is making an important speech tomorrow, you see, which'll draw everybody's attention away from you."

"Indeed?" said Rero. "Should we not join in heeding your . . . your head of state?"

"If you want." Indigo gave a very Arvelan-like shrug. "However, I'm told it'll be on internal matters—currency stabilization, ethnic discontents, revolutionary sentiment on certain colonial worlds and how we should quell it—nothing which makes any difference to you, I should think."

"I don't know what *I* should think," she blurted, and gave up. What we had heard hovered on the edge of making sense but was never quite seizable, like a chant in a dream. Could we ever win enough



understanding of these creatures that we would dare trust them?

Indigo led us down a staircase hewn from the rock, to a lower level where a hangar stood open. Despite lessened weight here, I was glad to see that end of our walk. The water-circulation unit felt heavy on my back. Humans who come to Arvel have an advantage over us in that regard, needing less life support apparatus. Their survival depends more on maintaining a particular range of temperatures than it does on maintaining a temperature differential.

We climbed into the spearhead craft which waited for us and reclined into specially modified seats. An attendant connected our suits to a pair of full-cycle biostatic units in the rear of the cabin, greatly increasing our comfort. "Relax, friends," Indigo urged. "This is a suborbital jet, you remember."

We'll reach Taiwan in an hour."

"You are kind to us," Rero said. Calm and cool, her gratitude laved me as well.

The human's beaky countenance crinkled in what he could have called a smile. It is a large part of their meager body language. "No, no, milady," he replied. "I get paid for assisting you."

"But is this not . . . unauthorized, is that the word? Don't you risk trouble for yourself, if your elders accuse you afterward of having acted unwisely?"

The bars of hair above his eyes drew together. "Only if something goes wrong and they find out. I admit it could happen, though it's very unlikely. As I've tried to explain to you, we have antisocial elements on Earth, criminals, political or religious fanatics, lunatics. They could make you a target. That's why the Citadel's had you closely guarded and kept you to a strict itinerary. But since this is a secret trip, we ought to be safe, and I do want to oblige you whenever possible."

The aircraft rolled forth and lifted easily, as if on a quite ordinary flight. Not until we were in the stratosphere did she unleash her entire strength. Then stars blinked into view, the planet became a many-marbled immensity, we soared above a continent which dwarfed any upon Arvel until we began slanting down again toward the ocean east of it. Silence prevailed among the passengers. Indigo puffed nervously on a series of smokesticks, the cabin attendants watched a television show, the crew were elsewhere. I knew no reason to be taut, but my hearts thudded ever more loud and I saw that Rero felt the same. To the minute degree that sight and touch, nothing more, permitted, we

spent most of the journey making love.

Night was young over the island, Earth's single moon rising full. The Maclaren home stood by itself, likewise on a mountain though one that held trees and gardens to the top. Our craft descended silently, as a glider, probably unnoticed save by a traffic control computer or two. For lack of a proper landing strip such as its size required, it employed a straight stretch of road which bore no traffic at this hour. I admired the pilot's skill. More did I admire Indigo's, in gathering information and making arrangements. To do that when the Protector's spies seemed to be everywhere struck me as remarkable.

The flyer halted by an upward-bending side road. Our man peered through a window. "He's here, waiting," he said. "Go on out. Fast, before somebody else happens by. We've got to scramble. I'll be back for you at this time tomorrow evening."

We had already been unplugged from the bio-stats and had restarted our portable units. They could maintain us that long, though not much more. Food would be dried rations shoved through a helmet lock, drink would be water sucked from a tube, waste release would be into an aspirator, rest would be uneasy and sexual intercourse nil. However, if we could achieve real converse, it would be worth everything. We scrambled forth with eagerness making our auras dance. The flyer taxied off at once, rounded a curve, and vanished. After a moment we heard a rumble and saw it take off above the shoulder of the mountain, an upward meteor.

Terangi Maclaren stood shadowlike in the dim light, save for his own deep-colored radiation. "Welcome," he said, and briefly clasped our gloves.

We'll have to walk; those rigs of yours wouldn't fit in my car. Follow me, please." I decided he was this curt because he likewise was anxious to get us hidden.

Trees turned the drive into a gut of darkness. We switched on our flashlights. "Can you do without those? Maclaren asked. "That blue-white isn't like anything a local person would use."

Rero-and-I doused them. "Suppose we link hands and you lead us," she suggested. When we had done this, she wondered, "Are you indeed worried about the possibility of our being observed? Can you not deny curiosity seekers access to your—" She groped for a word. They do not seem to have kin-right on Earth. "Your property?"

"Yes, but gossip might reach the wrong ears," he explained. "That could bring on trouble."

"Of what kind? Surely you do nothing . . . unlawful? . . . in receiving us."

"Technically no." By now I believed I had learned the nuances of the human voice sufficiently well to hear bitterness in his. "But the Citadel has ways to make things unpleasant. For instance, you may recall I'm an astrophysicist. These days I'm directing a survey in detail of the stars we have access to—expensive. By hinting that funds might otherwise be cut off, a bureaucrat could get me dismissed. And I do have independent means, but I'm a little old to go back to playboying."

Footfalls resounded loud on the pavement, through a rustle of leaves in a sea breeze. I toiled up the mountainside under a burden of gear, in a cramped loneliness of my own scents and no other. The night of Earth pressed inward.

"Of course," Maclaren went on after a while, "I

may be borrowing grief. It's no secret that I'm strongly in favor of close relationships with Arvel. To date, that hasn't caused many obstacles to get thrown in my way—though it hasn't been exactly smoothed for me either. My talking to you in private needn't necessarily alarm the Protector and his loyalists. It might even encourage people in the government who agree with me. I just can't tell. Therefore, let's be as cautious as practical.

"Besides," he added, "there are individuals, yes, organizations that hate the idea of making alliance with you. They could do something rash, if they knew you were here unguarded."

Indigo had intimated the same. Rero-and-I had failed to understand. "Why?" I asked into the darkness. "Yes, I realize many will be wary of us because we are an unknown quantity. We have their kind on Arvel. In fact, frankly, sir, the pair of us came largely in hopes of learning more about your kind."

"A hope that has been frustrated," Rero put in. "We have become convinced we are deliberately being hurried along and kept busy, in order that we will return home still ignorant . . . or downright suspicious."

"Terangi Maclaren," I said, "you speak as if more is involved than exaggerated prudence. You give the impression that certain humans want to isolate humanity from us on principle."

"That is the impression I meant to give," he replied.

Through my glove I felt how his clasp tightened. I returned the tension to him, and Rero shared it with me.

"I'm not sure how clear I can make the situation," Maclaren said with care. "Your institutions are so

utterly unlike ours — your beliefs, your ways of looking at the universe and living in it, everything — Well, that's part of the problem. For instance, the Hiroyama Report. Do you know about that? Hiroyama tried to find out what your major religions are. Her book created a sensation. If a powerful, scientifically oriented culture can hold that God is love . . . with sex apparently the major part of love — well, that defies a lot of old-established Terrestrial orthodoxies. Heresies spring up, which provokes reaction. Oh, yes, Hiroyama did mention that Arvelans practice monogamy and fidelity, or so she thought. She couldn't be sure, because their spokesmen never described this as a moral requirement. Therefore the new human cults, most of them, go in for orgies and promiscuity."

Though we had encountered curious sexual patterns elsewhere, Rero still faltered in surprise: "Mating for life — what else can we do?"

"Never mind now," Maclarens said bleakly. "It's a single example of why some groups on Earth would like to ring down the curtain forever on contact with Arvel. And by extension, with any other high-level civilization we may come upon. For practical purposes, what matters is why the Protector fears alliance, and his followers do."

"You see, the Citadel already has a nearly impossible job, trying to keep control over the human race, including settlers on the colonial planets and the societies they're developing. Disaffection, subversion, repeated attempts at rebellion — You mean you Arvelans have never had similar woes?"

"Why should we?" I asked in my bemusement. Did the vague ruddiness of his aura show him nodding? "I'm not too surprised, Voah-and-Rero."

(He was that familiar with our mores. Hope blossomed small within me.) "Since you don't have anything we could call a proper government, you avoid its troubles and costs. To be sure, we're a different breed; what works for you probably wouldn't for us. Just the same, already quite a few thinkers are wondering aloud and in print if we really need a state sitting on us as heavily as the Citadel does. Given close, ongoing relationships with you, the next generation may well decide we don't need the Citadel at all.

"Besides that, well, simply doubling the space available to us, the number of planets we can occupy, that alone will soon make us ungovernable as a whole. We'll explode in a million different directions, and God Himself can only guess at the ultimate consequences. But a single thing is certain. It will bring down the Protectorate.

"Oh, our present lord can doubtless live out his reign. His son after him . . . maybe, maybe not. His grandson: impossible. And he isn't stupid. He knows it.

"At the same time, the Dynasty does still command powerful loyalties. A lot of people fear change for its own sake—not altogether unreasonably. They have a big stake in the existing order of things, and would like to pass it on to their children.

"Others—well, for them it's more emotional, down in the marrow, therefore more strong and dangerous. I don't know if you can imagine, Rero-and-Voah, what grip the Dynasty has on a man whose fathers served it these past three hundred years. What are *your* mystiques?"

We didn't try to answer that. The thought gave

me a faint shock: that I too probably lived by commitments so deep-seated that I didn't know they could override my reason. I heard Rero say, "You yourself would open the portal wide between our races, would you not, Terangi Maclaren? And surely many are with you."

"Right," he told us. "In and out of the government, there's a mighty sentiment in favor of going ahead. We feel stifled, and we want to let in a clean wind we can hear blowing. . . . Yes, it's a delicate balance of forces, or a multi-sided political struggle, or whatever metaphor you prefer. I do believe Arvelans and Earthlings are overdue for getting some real depth-psychological empathy with each other. That ought to clear away suspicion, ought to give the movement for freedom overwhelming strength." His tones, hitherto low, lifted. "How glad I am you came here."

The drive debouched on a level stretch of ground, the woods yielded to openness, and we were again out in light. To Maclaren, with his superior night vision, the view must have been magnificent, for even I found it beautiful. On our right the mountain rose further, on our left it plunged downward, in frosted shadowiness where here and there gleamed yellow the windows of a home. Far off on the seashore, a village twinkled in countless colors. Beyond reached the ocean, like living obsidian bridged by moonglade. Across the sky glimmered the galaxy. Everywhere else were individual stars, each of them a sun.

Maclaren led us among flowerbeds and across a wide stretch of lawn, to his house. It was low and rambling, the roof curved high; it had been built largely of timber, according to a pattern that I felt

must be ancient in these parts; I wished very much that I could savor it with unmuffled senses. A lantern lighted a verandah. As we mounted this, the main door opened. A female human stood in the glow that poured out from behind her.

We knew her at once. Not being sure we would, Maclaren said, "Do you remember my wife, from the program we were on together when you arrived? Tamara." In the flicker of bright and black across Rero's skin, I saw my own shock mirrored. New as we then were to Earth, we had not caught any mention of Tamara's closeness to Maclaren. His wife? But she was David Ryerson's widow!.

We were inside the house before I was enough past my agitation to see that Maclaren had noticed it. Perhaps Tamara had too. Her manner was most gentle as she bowed her head above her hands laid together and murmured, "Be welcome, honored guests. It grieves us that we cannot offer refreshment. Is there any way we can minister to your needs or comfort?"

I saw that seats were provided to fit us in our sealsuits. Otherwise the room was long and lovely. Strange environment does not change the laws of harmonious proportion; swirls of wood grain in the floor, hues and textures of vegetable mats, were foreign but serene; a crystal bowl on a table held a stone and a flower, beneath a scroll of calligraphy that we did not have to read in order to admire; bookshelves breathed forth a promise; windows gave outlook on the night land, the sea, and the cosmos. A music player lilted notes of a piece that Rero-and-I had long ago told human members of the commission we enjoyed; the form is called

raga. An incense stick burned, but of course I could only smell the manifold acridities of my own confined flesh.

"You are kind," Rero said. "Still, are you not being overly formal? Voah-and-I came in hopes of . . . of close understanding."

"Then why don't you sit?" Maclaren invited. He and Tamara waited till we had. She perched forward in her chair, fingers twined on her lap. In a long skirt and brief blouse, her skin was golden-brown, her form abstractly pleasing to us. Framed by flowing blue-black hair, her eyes were like the bright darkness outside. Maclaren was tall for an Earthling, he stood with half his torso raised above Rero while his head reached well up on my chest. Seated, he assumed an attitude as casual as his tubular garments, lounged back with ankle over knee—but his gaze never left us and I recognized gravity on his face.

"What had you in mind, Rero-and-Voah?" he began.

We were silent a while, until I trilled a laugh of sorts and admitted, "We are seeking what questions to ask, and how."

Tamara confirmed my guess about her perception when she inquired, "What surprised you on the verandah?"

Again we must hesitate. Finally Rero said, "We do not wish to give offense."

Maclaren waved a hand. "Let that be taken for granted on both sides, hm?" he suggested. "We might well drop something ourselves that you don't like. In that case, tell us, and we'll all try to find out why, and maybe we can get a little enlightenment from it."

"Well, then—" Regardless, Rero must summon her courage. "Tamara Ryerson, is that your proper name now? You are wedded to Terangi Maclaren?"

"Why, yes, for the past eight years," the human female replied. "Didn't you know?"

I tried to explain that the information had gone by us because of its alienness. Astonished in her turn, she exclaimed, "Doesn't it seem natural to you? Terangi and David were friends, shipmates. When Terangi came back, he found me alone with my baby, and helped me—at first for David's sake, but soon—Would you consider it wrong?"

"No," I said hastily. "We Arvelans also differ in our customs and beliefs, from culture to culture."

"Although," Rero added, "none of our kind would remarry . . . that quickly, I think. A young person who was widowed might remarry, but after several years."

"An older one?" Tamara asked softly.

"As a rule, they go asexual—celibate, if I remember your word aright," I told her. Fearing she might regard that as cruel: "This has been an honorable estate in every country and era. In civilized milieus, institutions have existed, such as . . . lodges, would you call them? . . . to give the widowed a solid place, a new belongingness."

"Why can't they remarry, though?"

"Few societies have actually forbidden remarriage at any age. It's just that few persons want to, who've had a mate for a long while."

Maclaren made a chuckling noise. "And yet, as far as I can tell," he remarked, "you Arvelans are hornier than us humans, which is saying a lot."

I exchanged a look, a handclasp, and a sexual signal with Rero.

"What makes the difference?" Tamara wondered. "Sorrow?"

"No, sorrow wears away, if I use that word correctly," I answered, doubtful whether I did. (Afterward that doubt was to grow. Do they indeed mourn as we do?) "But think, please. Precisely because of the close relationship, personalities have blended. Remarriage involves changing one's entire spirit, that originally developed in young adulthood after the first wedding. Not many individuals want to become somebody quite different. Of those who might wish to, not many dare attempt it."

Sensing Tamara's puzzlement, Rero said in her most scientific manner:

"It has long been obvious that sexual dimorphism is greater among Arvelans than among Earthlings. In your species, the female both carries the child to term and nurses it afterward. Among us, she carried the fetus a much shorter time, then delivers it and gives it to the male, who puts it in his pouch. There it has shelter and temperature differentials till it has matured enough to venture forth. However, the mother does provide nourishment for the infant from special glands—milk, is that your word? This means the male must always be close to her, to hand the infant over for feeding. It means, too, that he must be large and strong. That leaves her free, in an evolutionary sense, to become small but agile. Our presapient ancestors hunted in male-female teams, as savages did within historical times. Civilizations have not changed that basic partnership; most work has always been organized so as to be done by mated couples. The interdependence goes beyond the physical, into the

psyche. Among the primitive peoples, the widowed have generally pined away. A large part of our history and sociology has turned on the provision of various means to give the asexual a survivor's role."

"Oh, yes, Tamara knows that." Did Maclareen sound annoyed, as if his wife had been insulted? "We've both followed the reports of the study teams."

"No, wait, dear." Her fingers brushed across his. "I think Rero—Rero-and-Voah are trying to tell us how it *feels*." Her vision met ours. "Maybe we can tell you how it feels in us," she said. "Maybe that's part of the knowledge you're searching for."

She rose, crossed to where Rero sat, and squeezed the armored shoulder. Immediately realizing, she gave me the same gesture. "Would you like to see our children?" she asked. "There's the oldest, David's and mine. There are two more, Terangi's and mine. Will you believe that he loves them equally?"

Memory rushed over me of *The Adopted Son*. I have merely read it in translation. Somehow, though, across oceans and centuries, Hoiakim-and-Ranu's genius has come through to me. I think that from their poetry I know what it meant to live in a land where the nursing or pouching of an infant not one's own was not the highest form of devotion and sacrifice, but was actually taboo. It may be that from this I have an inkling of how deep goes the caring for our young.

Except . . . is this what she intends to say? I wondered.

"I wish you could cuddle them," Tamara said. "Well, they're asleep anyhow. You'll meet them properly tomorrow. What a gorgeous surprise for

them!"

She activated a scanner to show us their rooms. I was touched and fascinated: the chubbiness of the small, the lengthening limbs of the oldest. Rero paid more heed to the adults. In our language she asked me, "Is my impression right, that in his mind they are secondary to her?"

"I have no idea," I confessed. "I'm wondering how they will feel about each other—the five of them—after the children are grown."

"And what is intrinsic, what cultural?"

"Impossible to say, darling. It could be that in them, parental emotions are potentiated by close association with the offspring, and in most human societies the mother enjoys more of this than the father does. . . ."

The bit of intimacy went surprisingly far to ease things between us four. If we could not share smokeleaf, food, drink, odors, prayers, we could share parenthood. For a while Tamara was quite eagerly gossiping with Rero-and-me about our respective households. At last Maclaren said:

"Do you know, I suspect we may already be verging on an insight that's never been reached before." He paused; I saw him quiver where he sat. "Sure, sure, naturally we've gotten endless speculation on Earth, and doubtless on Arvel. How basic is the psychosexual element to any intelligent race? But it's been pretty dry and abstract. Here, tonight—well, we won't solve that problem, but might we not make a start on it? I've a wild guess as to how all your institutions, in all your cultures, may spring from your reproductive pattern. Might you be able to make a guess like that about us? It could tell us things about ourselves that've been mysterious

through the whole of our history."

I thought for a span before I replied, "If nothing else, Terangi Maclareن, your guesses about us ought to reveal something about you."

He leaned forward. His hands made gestures. His tone held eagerness:

"With you people, the nuclear family—*really* nuclear—has got to be the basis of everything, everywhere and everywhen. It's the indissoluble unit . . . and I wish you could give me an idea of what the indissoluble unit is among humans.

"Your history, what little of it we know here on Earth—Never a nation-state. Usually clans, that might keep their identities for many centuries . . . forming tribes, that might keep their identities for a few centuries . . . but the families endure. They trace themselves back to mythic ages.

"More parochialism than on Earth, progress a local affair, few changes ever happening at once over your entire planet, obsolete and evil matters persisting till late dates in corners of the world. However, no nationalism; variety not getting ground down into uniformity; if nothing like democracy, then also nothing like absolutism; eventually, gradually, a union of the whole species on a loose and pragmatic foundation; no public passions, even for good causes, but no public lunacies either—

"In religion . . . when monotheism came along, God was bisexual—no, I suppose 'supersexual' would be a better word, but sexual for certain. At the same time, in everyday life, orderly sex relationships are the norm, taken for granted—therefore you don't have to worry about regulating that, you can make moral investments different from ours—"

The door flew open. A weapon came through.

Three men, likewise armed, crowded behind the automatic pistol of their leader. The whole group wore nondescript coveralls and hoods to mask their faces. Behind them I made out the raindrop shape of a little aircraft parked on the lawn. Engrossed in talk, we had none of us heard its whispering as anything but a night wind.

We sprang to our feet. "What the hell?" ripped from Maclaren.

"Vincent Indigo!" Rero-and-I cried together.

He was taken aback at our recognition of him. Unequipped for much conscious use of body language, humans are blind to countless details. He rallied at once, chopped air with his firearm, and snapped: "Silence. Not a peep out of you. The first that starts trouble, we'll shoot." A pause. "If you cooperate, nobody need get hurt. If you don't the kids might suffer too."

Tamara gasped and clutched at her husband. He laid an arm around her waist. Rero-and-I joined in a look of longing. We couldn't touch.

"We're taking the Arvelans away," Indigo said. "A kidnapping. The government ought to pay a fancy sum for their release. I'm telling you this so you'll see we don't mean worse and it's to your advantage to be good. Sir and Lady Maclaren, we're going to disable your phone and your car, to keep you from giving the alarm before we're a safe distance off. We don't want to do you more harm than that, and won't if you stand quietly where you are. As for you two . . . creatures, we don't want to harm you either. No ransom for a corpse, eh? We'll take care of you if you behave yourselves. If you don't—well,



a bullet doesn't need to kill you by itself. It only needs to make a hole in your sealsuit.

"Quiet, I said!" he ordered as Maclaren's mouth stirred. To his followers: "Get busy."

They grunted assent. One attacked the telephone. Not content to break its connection, he put a shot through the screen. The hiss of the pistol, the crack of splintered glass sounded louder than they were. He used the scanner to make sure the children had not roused, then rejoined Indigo in keeping watch on us. Meanwhile his companions had gone back inside, evidently to the garage for their own task of demolition. I had noticed tools hung at their waists. This was a carefully planned operation.

Stupefaction left me; anger seethed up. *Vincent Indigo! The rest are unknowns—he must have left the official craft when it landed at a nearby airport to*

wait for tomorrow, and met them —Was he always a criminal, who slithered his way into public service, or was it the chance he saw which corrupted him?

No matter. He dares endanger Rero!

Beneath the fury, a logical part of me was baffled. His actions don't make sense. Probably he supposes, probably rightly, that his name didn't register on the Maclarens when we uttered it. Voice transponders or no, we do have a thick accent. Nevertheless, can he really hope that his part in this business will remain hidden? He has to return us if he wants to collect his price, and we'll denounce him —

Is he insane, to overlook that? Are his accomplices, too? He never struck me as irrational. But what is sanity . . . in a human?

My glance went to Maclaren and his wife. Over the years I have learned in slight measure to read expression, stance, aura in that race. Fear had largely departed from them, now that it appeared there was no direct physical threat. He stood a-scowl with thought, and a cold wrath was coming over him. She was regarding us, her guests, with a horrified pity. Though they remained in bodily contact, that was not where their attention lay.

It would have been for Rero-and-me, of course, if we could have touched. But we could simply hold gloves and make forlorn skin-signs.

The two men re-entered and reported their task done. "Fine," Indigo said. "Let's get going. You"—he pointed at the human prisoners—"stay indoors. You"—that was us—"go on out."

The four kidnappers moved cautiously, two ahead of us, two behind, while we shuffled forth. Moonlight glimmered on early dew. The stars looked infinitely far. The lights of the village and

of neighboring houses looked farther still. Most distant was the yellow glow from the home we had left.

Rero attempted speech in our language. Since our hosts could no longer hear it, Indigo did not forbid. Her words hurried: "Beloved, what do you suppose we should do? How can we trust them? They must be crazy to believe they can carry this off and go unpunished."

So her thought had paralleled mine to that extent: hardly a surprise. Mine leaped onward. "No, they can reason, in a twisted fashion," I said. "Else they wouldn't have the kind of preparation and discipline they do. Perhaps they have a secure hiding place ready, or a change of identities, or whatever. The risk would still appear enormous to me—considering that we represent a whole planet, won't the Citadel bend every effort to hunting them down?—but what do we know of the ins and outs of Earth?" I clamped her fingers in mine, hard. "Best we stay calm, alert, bide our time. The ransom will surely be paid. If the Protector won't, then I expect those people who want alliance with our kind will subscribe to the sum demanded."

We reached the aircraft. Its door stood ajar above us. "Go on in," directed Indigo. His men drew closer.

We could not enter side by side in our bulky equipment. As it happened, I went first, climbing up a short extruded ladder. Cabin lighting was weak but sufficient. My gaze traveled aft, and I stopped short in the entrance.

"You have only one biostatic unit!" I protested. My hearts began to gallop. A roaring rose in my head.

"Yes, yes, we've no room for two," Indigo said impatiently. "Either of you can plug into it if you like. The other can last in his suit, or hers, till we get where we're bound. There we have an Arvel-conditioned chamber."

My look sought Rero's. Though her countenance was a blur in the moonlight, her aura throbbed red. Mine did too. She spoke in our language: "If that is true, why need they bother with a unit at all? They only mean to keep one of us alive. Not both."

"Alive as a hostage." My words sounded remote, a stranger's. "This is not a capture for money."

And rage took us into itself.

She at the thought that I might have to die, I at the thought that she might have to die, went aflame. You can imagine; but in these peaceful years of ours, you cannot know.

We were no longer persons, we were killing machines. Yet never had our awarenesses been more efficient. I believe I saw each dewdrop upon each blade of turf around the feet of those who would let Rero perish. I knew that my suit and its gear made me awkward, but I knew also that they were heavy. I gauged and sprang.

A man stood beside the ladder. My boots crashed on his skull. He went down beneath my mass, we rolled over, he lay broken, I lumbered up and charged at the next nearest. Rero was entangled with a third man Indigo danced about. He hadn't fired immediately for fear of hitting a comrade. He would in a moment, I knew, and Rero-and-I would be dead.

Dead together.

A form hurtled from the verandah, across the lawn, toward us. Utterly astounded, I did not slay

him with whom I grappled, I only throttled him slack while I stared.

Maclarens. Maclarens had abandoned his wife to come help us.

He caught Indigo by surprise, from behind—grabbed the pistol wrist, threw his left arm around the man's neck, put a knee in the back.

I mastered myself and went to aid Rero. Despite her weight of apparatus, her small form was bounding back and forth, in and out, fast enough for her enemy to miss when he shot. Him I did pluck apart.

The moon stood higher when calm had returned to us. It had to the Maclarens earlier. In him it took the form of sternness, in her of a puzzled half-compassion, as we loomed above Vincent Indigo. He huddled in a chair, a blot upon that beautiful room, and pleaded with us.

"Certainly I'm going to take your flyer and fetch the police," Maclarens said. "But before then, in case the Citadel tries to cover for you, I want the facts myself." He realigned his audiovisual recorder. "Several copies of this tape distributed in the right places—You were acting for the Protector, weren't you?"

Wretchedness stared back. "Please," Indigo whispered.

"Shall I break a few bones?" I asked.

"No!" Tamara exclaimed. "Voah, you can't talk that way. You're civilized!"

"He would have let Rero die, wouldn't he?" I retorted.

My wife's arm went around me. Through my sealsuit, I imagined the pressure, and the same desire kindled in us both. How long till we could



appease it? I heard the force she must use to stay reasonable as she counselled in our language: "Better we be discreet. Two men killed in a fight, that's condonable. But it wouldn't speak well for us, in human ears, if we injured helpless prisoners."

I subsided. "Correct," I said, "though does he need to know this?"

The spirit had gone out of Indigo anyhow. His aura flickered bluish-dim. He dropped his glance to the floor and mumbled, "Yes, that was the idea. Trying to make the Arvelans break off negotiations because they'd decide our race is too—oh, too unstable to be safe around. It couldn't be done officially, when so many dupes are putting on pressure for a treaty conference."

Maclarens nodded. "We were supposed to think it was the work of a criminal gang," he said. "Which it was indeed. A criminal gang in the Citadel, running the government. When that news breaks, I hope to see them not just out of office, but on trial."

"No!" Anguish whipped through Indigo. He raised eyes and hands, he shuddered. "You can't! Not the Protector—the *Dynasty*—God alive, Maclarens, can't you understand? That's what we've been trying to save. Would you let it crumble? Would you leave us defenseless before a pack of monsters?"

Silence grew until at last Maclarens said, from the bottom of his throat, "You actually believe that, don't you?"

"He does, he does," Tamara cried through tears. "Oh, the poor fool! Don't be too hard on him, Terangi. He was acting out of . . . out of love . . . wasn't he?"

Love, for such an object? Rero-and-I shared horror.



"I don't know as how that excuses him," Maclaren said grimly. "Well, we have his admission. Let the courts decide what to do with him and the rest. It won't matter."

He straightened, I saw him easing muscle by muscle, and he said to us: "What does matter is that the plot failed. I suppose there'll have to be a lot of behind-the-scenes bargaining, compromises, pretenses that certain individuals never were involved—political expediency. Not too important. What is important is that we can use the scandal to bring down the whole clique that's wanted to lock us up in a hermit kingdom. We will be leaguing with Arvel." Wonder trembled in his voice. "We truly will."

Truly? passed through Rero-and-me.

"Your doing!" Tamara hugged us both where we

stood. "If it hadn't been for your courage—"

"Why, there was no courage," Rero told her. "If we had gone meekly along, one of us would have died. What had we to lose?"

The knife that had formed within my soul flashed out of its sheath. "We would have been killed—which ought to have served the purpose reasonably well—if you had not intervened, Terangi MacLaren," I said, as if each word were being cut out of me.

He didn't notice my mood, in his pleasure, as he replied, "What else could I do, after the fighting began?" He hesitated. "It wasn't just your lives, Voah-and-Rero, though of course they meant a great deal. It was realizing that your race might well be provoked into withdrawing from ours. And that would have been about the most terrible loss humanity has ever had. Wouldn't it?"

"Your wife was endangered," I declared.

"I knew that," he said. They gripped hands, those two. Nevertheless he could tell me while she listened and nodded: "We both did. But we had the whole world to think about."

Rero-and-I do recommend making a pact, sharing transporter networks, conducting what trade and cultural exchange are possible. In our opinion, this will bring benefits outweighing any psychic harm of the kind that some fear. We can even suggest precautions to take against troubrous influences.

Above all, O people of Arvel, never pity the beings on Earth. If you do, then sorrow will drown you. They know so little of love. They cannot ever know more. ●

GOOD-BY
TO
ALL
THAT

by Frederik Pohl



Photo by Jay Kay Klein

The other day my contract as Bantam Book's science-fiction editor ran out and I declined to renew it. I'll still continue to ride herd on a few special projects, but that's it. Nothing new. (For any reader who may wish to submit to Bantam, Ms. Sydny Weinberg is the person to submit to.) I started editing science fiction with *Astonishing Stories* in 1939, so that makes thirty-nine years of doing it, and that's really enough.

But the decision to hang up my blue pencil (actually, these days it's a red Flair) makes me philosophical, and I'd like to talk about the theory and practice of editing.

What is an editor?

The best answer I know is an old novel called *Friends of Mr Sweeny*, by Elmer Davis. It's long out

of print, and I haven't read it for dozens of years, but as near as I can remember it says, "An editor is a man who can explain dam design to an archaeologist and Egyptian burial customs to a hydraulics engineer." An editor is a middleman. He squeezes enough money out of the publisher to keep the writers going, and secures good enough work from the writer to turn a profit for the publisher. He conveys to the readers what the writers are trying to do, and explains to the writers what the readers will sit still for. He doesn't have to know science, but he has to be able to tell if a writer does. He doesn't have to have the creative or literary skills of a writer, but he has to be able to maximize them in his contributors. Those are *minima*. If he is good, he can be more—oh, much more—than that.

Science fiction owes more to its editors than any other branch of literature, and this is a curious thing. Who knows who Mark Twain's editor was? Or, for that matter, Joseph Heller's or Jacqueline Suzanne's? But the names of John Campbell, Tony Boucher and Horace Gold are mighty in sf. Even members of the Mystery Writers of America might have trouble identifying Cap Shaw or Daisy Bacon, but what SFWA member is ignorant of Hugo Gernsback?

The *best* science-fiction editors—so say I, anyway—knew sf before they began editing it. Campbell, Gernsback, Gold, Bova and Boucher wrote it. Hornig, Scithers, and Wollheim were fans. McComas had been an anthologist; Mills had been associated with sf publishing in other capacities before taking over as editor.

Contrariwise, the worst sf editors are the ones

who never had any interest in science fiction until someone told them to. Now, there are a few honorable exceptions. Judy-Lynn del Ray had no idea there was such a thing as science fiction before she came aboard as my assistant at *Galaxy* in the mid-60s—and what a powerhouse she is! Betty Ballantine, almost the same. F. Orlin Tremaine had it even tougher; he became Street & Smith's editor of *Astounding* because Management pointed at him and said, "You're it"—and he didn't even have the example of an earlier savvy sf editor to learn from, because there had hardly been any. But how rare these exceptions are!

Over the past fifty years there have been close to five hundred editors charged with buying or bouncing science fiction for American publishers. Maybe twenty-five, tops, have been really standout good at it. Perhaps another fifty, pretty good; and fifty more have had the ability, but the publisher wouldn't pay or the magazine folded or the books were badly produced—endless are the hazards that can destroy an editor's work—and so it went for naught.

The other three hundred and seventy-five?

Well. . . . A lot of them were nice people. A quality which, along with ten pennies, will get you a dime.

Your average everyday science-fiction editor of the present is usually young, generally possessed of a brand-new bachelor's degree in English Lit. and more often than not female. None of these qualities disqualify her—or him. But they don't do diddly-squat to qualify him, either. The best thing you can say about them is that they are irrelevant to being any good as a science-fiction editor—and yet

there, over and over, they are. If we are lucky, sometimes he (or she) has at least read science fiction at one time, and that's cool. He might still be lousy as an editor, but at least he's got the tools to work with.

But all too often he has not. Of the ones who know nothing about sf, some are tragically unaware of their ignorance; they've seen *Star Wars* and read *Chariots of the Gods*, and what else do they need? God help them—and us. Some do know how little they know. So first day on the job they call up someone who they think can explain it to them in ninety minutes. They take him to lunch, and they do what he says. Or what they retain of what he says. Or what they have understood of what they retain of what he says. That system can break down at every point, but where it goes most terribly wrong is in selecting the brain to pick; oh, brethren, what flakes have laid down laws that bound us all!

Now, if there were a God in Heaven it is certain the He would smite these sinners with the scourge of Returns and the pestilence of Losses. Perhaps He is busy elsewhere. I do believe, as a matter of faith, that there is some rough justice in the world and that, statistically speaking, good books on the whole will perform better than bad ones. But that's faith speaking, not evidence. The evidence is less sure. Production values count. Hype works. Management orders get followed. The book that is so bad that it cannot somehow be inflated into some sort of success has not yet been written, and many a sinner has prospered a lot.

I don't mean that it is easy to jump up a dog into a best-seller. It isn't. It takes money, and effort, and resourcefulness, and even then it doesn't always work. (Thank God.) But there are powerful

strategies available to those willing to use them. Window displays. Space ads. TV spot commercials. The more effective they are the more they cost, and sometimes they cost more than they're worth. Still, if you put a million dollars into TV spots you are going to sell a million books—regardless, or anyway *almost* regardless, of what the book is. If a top editor, with both muscle and credibility, tells the annual sales meeting that they'll sell 60,000 copies of this here hardbound, then they will. (At the cost, maybe, of selling 60,000 less of something else.) One very large hard-cover company used to be in bed with one very large bookstore chain. The salesmen used to get a secret cash bonus for every copy of that publisher's book they sold. Until anti-trust made them stop, it was *impossible* for that publisher to bring out a book that lost. Other publishers discounted books—take a nickel a copy less than the big boys charge. That makes a significant difference to an outlet that moves a hundred thousand books a week. In the bad old days, sometimes that nickel went under the table to the buyer for the chain—and, boy, did *that* make a difference! (Now you know why your local Mafia numbers front used to have all those copies of *Squalid Sex-Goddesses of Sigma Lyrae* and so little of Clarke or Heinlein.)

I've been talking about exceptional promotion methods, and even a few sort of illegal ones. But there are many that are legal and even customary, and when they are put to work they make books move. And it's not just promotion. If you can scheme a way to save a penny or two on printing each copy—or attract advertising or some other revenue—or tie in with a red-hot TV or movie project—or find a cover or a blurb that works—or

do any of a hundred other things, you can move a book that will just lie there on its own. Oh, it's certainly a real plus factor if an editor can tell the difference between a good story and a bad one. But even if he can't, he can survive—and if he can, he can prosper—if he can get the other factors working for him.

To succeed as an editor, you must get your hands on the levers of power:

To make the machine go. To bully, bribe or sweet-talk the sales people and the promotion people and all the other people in the place so that they do all the things they should do anyway, but won't.

To change the machine's programming. Schedules, prices, contract terms, formats are not ordained by God, only by Management. When Management's wrong, it is an act of loyalty to straighten them out. (Although they don't always see it that way.)

And, having done all that, you can then think about that third and most pleasurable lever to work:

To introduce the person into the machine. To so interact with the writers, the people that publishing is all about, to produce words that entertain, enlighten, stimulate, inspire and/or delight the reader. And you.

What gives an editor the right to tell an author how his story should be written? John Campbell used to defuse that charge by saying, "Look, Fred." (Or Isaac, or Doc, or Bob.) "You know more about yourself than I ever will, but there's one part of you that I know better than you do. That's the back of

your neck. I can see it, and you can't; and it's the same with this story." and, as so often, John's quirky logic was pretty much right. A writer can get so wrapped up in his story that he cannot see forest for trees.

I know this is so for me, as writer. So I make it a practice to let the rough draft of anything I write cool for a while—a week, a month, sometimes a matter of years—until I have forgotten enough of it to see it with fresh eyes, before I do the final draft. Even so, editors like Horace Gold have often brought me up standing by seeing something on the back of my own story's neck that was hidden from me. And that external view is what an editor can give to a writer that the writer can't always give himself.

And, oh, what fun to play God! That is the aspect of editing that sucks the English Lit. graduates out of Wellesley and Northwestern into the publishing world of Madison and Fifth. It was what hooked John Campbell for thirty-four years, so that he died still an addict. It's an ego trip.

It's also an opportunity to do something worth doing. Forgive me if this part sounds like vanity. It probably is; but it's worth doing, to find ways to bring to an audience good things they might not otherwise have. I've been talking about this at some length in my autobiography, *The Way the Future Was*, upcoming shortly in hard-cover at your favorite book store. But the autobiography stops about the time I stopped editing magazines—because events after that are still too close for me to make enough sense of them to write about them—and there are things that strike me as rewarding about editing books, too.

Of course, what I call "doing something worth while" you might easily call my "ego trip", because a lot depends, doesn't it, on what we each define as "worth while". But there's pleasure in publishing Delany's *Dhalgren*, after a dozen other editors have declared it unmarketable, and seeing it go through twelve large printings; in taking the gamble with a new writer like Janet Morris, committing to four long novels before one customer anywhere has bought one word of hers in print, and seeing *The High Couch of Silistra* build her an audience; in seeing a book where even the author hasn't seen it yet—as in the upcoming *Medea: Harlan's World*—and making it happen. There is a novel not yet published, and not science fiction, either, by a writer named Gustav Hasford. It is about the Vietnam war, and it is scarifying. I don't promise you will like it, but I promise you will never forget it; and when I came across it, quite by chance, the author had had a string of rejections from people who said, "Jesus, this is *remarkable*, but I don't see it as a commercial possibility." Well, maybe it isn't. But there is a religious question involved here. It is my religious belief that a voice that has something new and insightful to say about the world deserves to be heard; it is the publishing industry's responsibility to provide a forum for that hearing, and if it fails to do so it betrays its trust. So I went to bat, and Hasford is going to be heard at last, and I take delight in that I made it happen. Or made it happen now, anyway; because the other part of my religion states that if something is worth being heard, sooner or later some editor and publisher will give it birth. Hasford would not have been muted forever. As I've said, I think in the long run injus-

tices even out. (But the trouble with the long run, as John Maynard Keynes told Franklin D. Roosevelt, is that in the long run we are all dead.) It is an editor's privilege—and it is bloody well his duty, too—to repair some of the injustices while the author is still able to enjoy it.

So much for vanity . . . and maybe more than enough.

While I was writing this article, I had occasion to glance through an essay I had written called *The Publishing of Science Fiction*. (It's in a book called *Science Fiction Today and Tomorrow*, edited by Reginald Bretnor.) I wrote it only half a dozen years ago, but already the numbers are all wrong. I spoke of the average hard-cover sf novel price as maybe \$4.95, and of a typical author's advance as around \$2,000.

There's not much of that around any more. Not long ago a science-fiction novel went up for paperback auction, and in the bidding that followed it sold for around a quarter of a million dollars. That's an interesting number, in a lot of ways. The most interesting thing about it is that I did a little arithmetic, and it turns out that the aggregate amount I paid out as an editor to everybody, over a period of thirty years from 1939 to 1969, as editor of *Astonishing Stories* and *Super Science Stories*, as editor of the *Star* series of original anthologies for Ballantine, as editor of more than a dozen reprint anthologies over that period and finally as editor of *Galaxy*, *If*, *Worlds of Tomorrow* and others for nearly a decade—the total of checks for all of them put together, to every contributor, is probably just about that same quarter of a million.

A quarter of a million dollars is surely a high price to pay for a science-fiction book, even now. But it is not unique. There are books that have earned more. Sure, there's inflation to consider. The 1939 dollar was worth maybe ten times the present's in purchasing power. But if inflation has increased the numbers in everything by a factor of ten, it is also true that the earnings for science fiction have gone up by a factor of maybe a hundred. Science fiction used to have an occasional drift-in of writers who couldn't get published in any other field, and though maybe they could make it in science fiction. Now the drift-in is of writers who can get published in other fields, all right, but can't live on it. They think science fiction will be more lucrative, and sometimes they're right.

One reason for this escalation is the paperback auction I mentioned a moment ago. Most people don't know how that works—even many writers don't. It goes something like this. Some hard-cover publisher buys a science-fiction novel. They set it in type and print up sets of bound proofs, looking like a rather sloppy actual book, and send them around to the major paperback science-fiction editors: Jim Baen at Ace, Nancy Neiman at Avon, Judy-Lynn del Rey at Ballantine-Del Rey, Sydny Weinberg (or until recently me) at Bantam, Don Wollheim at DAW-NAL, Adele Hull at Jove, Dave Hartwell at Pocket, maybe one or two others. If they are confident, they set a date for an auction. If they're not, they wait for the phone to ring. Then, if somebody shows an interest in acquiring the right to publish that book in a paperback edition, they call around to the other editors to see if there's any competition, and if so *then* they set an auction date.

Considering the large appetitie for such goods on the part of the paperback publishers, it's surprising to say that there are a fair number of hard-cover science-fiction books published that no paperback editor wants to bid on. (Although, considering the quality of some of them, maybe it's not only not surprising, but even encouraging.) Once the auction starts, the phones run hot. "I've got thirty-five thousand, will you go for forty?" "Can I pre-empt right now for sixty-five?" The numbers may be larger, and they're often a lot smaller, but the auction is the name of the game.

All this is exciting, in a heady, heavy-pressure way, and it certainly has enriched a lot of us. Once the bidding fever starts, it carries publishers heaven knows where. But it is more like speculating on wheat futures than it is like Maxwell Perkins patiently going over line by line of Thomas Wolfe, or like John Campbell, endlessly firing off polemics and challenges, and chortling over the stories that came back. It is an interesting game to play. But so is Monopoly, and Monopoly, at least, does not distort one's values.

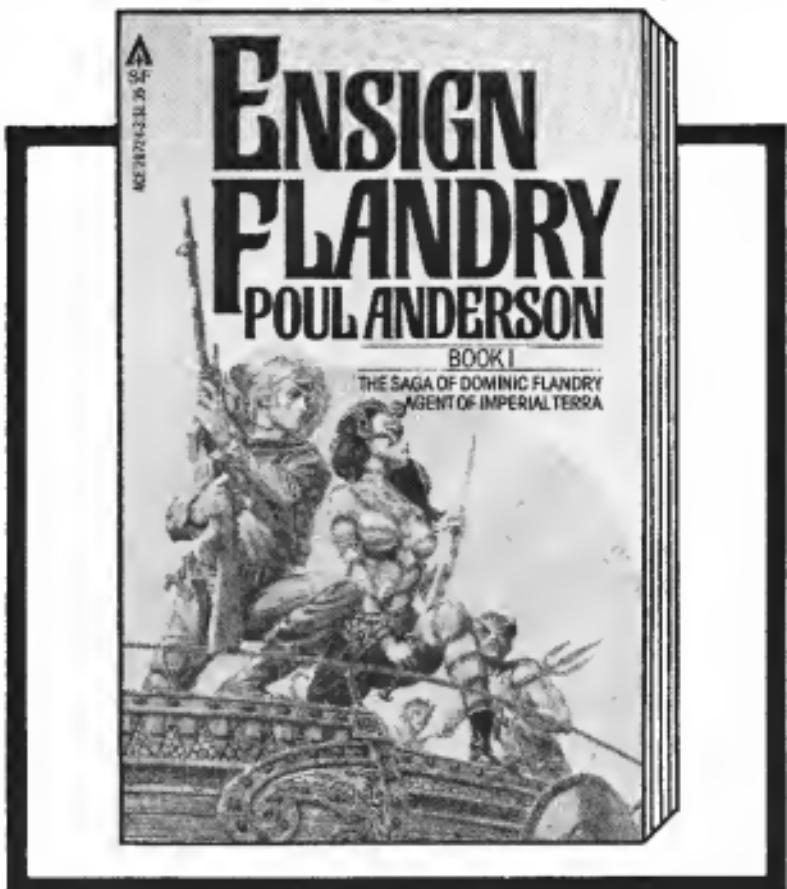
The really best thing there is about helping to create science fiction, whether as a writer or as an editor, is painting pictures no one has ever seen, stimulating thoughts that the reader might not otherwise ever have thought, suggesting concerns and delights that might not otherwise have occurred to anyone.

An editor can play a big part in that, but not as big as a writer can. And so at last, perhaps a little tardily, I've made up my mind. That's what I want to be when I grow up: a writer. ●

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GOOD-BY

FOREVER

TO

MR. PAIN

by Robert Sheckley





It's easy!



Joseph Elroy was nicely settled back in his armchair on this Sunday morning in the near future, trying to remember the name of his favorite football team that he was going to watch later on the tv while reading the bankruptcy notices in the Sunday Times and thinking uncomfortable thoughts.

It was a normal sort of day; the sky outside colored its usual blah beige which went well with the blah browns which Mrs. Elroy, now grinding her teeth in the kitchen, had decorated the place during one of her many short-lived bursts of enthusiasm. Their child, Elixir, was upstairs pursuing her latest discovery—she was three years old and had just gotten into vomiting.

And Elroy had a tune going in his head, he had 'Amapola' spinning just now, and it would continue until another song segued into it, one song after another, all day, all night, forever. This music came from Elroy's internal Muzak system, which came on whenever inattentiveness became necessary for survival.

So Elroy was in a certain state. Maybe you've been there yourself: the kid cries and the wife nags and you drift through your days and nights, well laid back, listening to the secret Muzak in your head. And you know that you'll never crack through the hazy plastic shield that separates you from the world, and the gray mists of depression and boredom settle in for a nice long visit. And the only thing that prevents you from opting for a snuffout is your Life-Force, which says to you, "Wake up, dummy, it's *you* this is happening to—yes, you, strangling there in your swimming pool of lime-flavored jello with a silly grin on your love-starved face as you smoke another Marlboro and watch the iniquities of the world float by in three-quarter time."

Given that situation, you'd take any chance that came along to pull out of it, wouldn't you? Joseph Elroy's chance came that very afternoon.

The telephone rang. Elroy picked it up. A voice at the other end asked, "Who is this, please?"

"This is Joseph Elroy," Elroy replied.

"Mr. Elroy, do you happen to have a *tune* or *song* going through your head at this moment?"

"As of matter of fact, I do."

"What is the name of the song?"

"I've been humming 'Amapola' to myself for the

last couple hours."

"What was that name again, Mr. Elroy?"

"Amapola. But what—"

"That's it! That's the one!"

"Huh?"

"Mr Elroy, now I can reveal to you what this is all about. I am Marv Duffle, and I'm calling you from THE SHOT OF A LIFETIME SHOW and you have named *the very tune* going through the head of our genial guest for tonight, Mr Phil Suggers! That means that you and your family, Mr. Elroy, have won this month's big synchronicity prize, The Shot of a Lifetime! Mr. Elroy, do you know what that means?"

"I know!" Elroy shouted joyously. "I watch the show so I know! Elva, stop freaking out in there, we've won the big one, we've won, we've won, we've won!"

What this meant in practical terms was that the following day a group of technicians in one-piece orange jumpsuits came and installed what looked like a modified computer console in the Elroy's living room, and Marv Duffle himself handed them the all-important Directory and explained how all of the best avenues for personal growth and change and self-realization had been collated and tied directly into this computer. Many of these services had formerly been available only to the rich, talented and successful, who really didn't need them. But now the Elroys could avail themselves of them, and do it all via patented superfast hi-absorption learning modalities developed at Stanford and incorporated into the equipment. In brief, their lives were theirs

to shape and mold as they desired, for free, and in the privacy of their home.

Elroy was a serious-minded man, as we all are at heart, and so the first thing he did was to search through the Directory which listed all available services from all the participating companies, until he found Vocationeers, the famous talent-testing firm of Mill Valley, California. They were able to process Elroy by telephone and get the results back to him in fifteen minutes. It seemed that Elroy had the perfect combination of intelligence, manual dexterity, and psychological set to become a topflight micropaleontologist. That position happened to be open at the nearby Museum of Natural History and Elroy learned all he needed to know about the work with the help of the Bluchner-Wagner School for High-Speed Specialized Learning. So Elroy was able to begin a promising career only two weeks after he had heard of it for the first time.

Elva Elroy, or Elf, as she called herself in wistful moments, wasn't sure what she wanted to do. She looked through the Directory until she found Mandragore, Inc., makers of Norm1Hi, 24 hour timed-release mood-enhancement spansules. She had them sent over at once with the Ames Rapid Dope Delivery Service—'Your High is our Cry.' Feeling better than she had in ages, Elva was able to face the problem of dinner. After careful consideration she called the Fancy Freakout Food Merchandisers—'Let Us Administer to the Hungry Child in Your Head.'

For their little daughter, Elixir, there was BabyTeasers, a crack service that cajoled the spoiled scions of oil sheiks, now available to the

Elroys on round-the-clock standby basis to get the kid out of her temper. Elixir was delighted. New big soft toys to order around! What could be so bad?

That left the Elroys with world enough and time in which to discover each other. They went first to the Omni-Pleasure Family Consultants, the ones who revitalized a marriage pronounced terminal on television in Houston last month. One counselling session brought the Elroys a deep and abiding love for each other whenever they looked deep into each other's eyes and concentrated, and it gave them the necessary maturity to take the Five Day Breakthrough with the Total Sex Response People of Lansing, Michigan. And this, too, was a success in terms of new highs reached and plateaus maintained, yet a certain anxiety crept into Elroy's performance and he felt the need to avail himself of Broadway Joe's Romantic Sex Service—'Illicit meetings with beautiful sexy broads of a refinement guaranteed not to gross you out.'

"Oh yeah?" said Elva when she heard about that, and instantly fulfilled a long-standing desire by calling Rough Traders Sex Service. She had been attracted by their ad in the Directory: 'Dig, you want it rough, raw, real, and sweaty, but you also want that it shouldn't be a turnoff. Right? Right. Call our number, baby, 'cause we got your number.'

They both got a little freaked out from it all, and cooled out with Dreamboat Launchers of Fire Island and their famous motto: 'Meditate the Easy Way, with Dope.'

The Elroys were really getting it all together now, but things kept intruding. Elixir was freaking out

again, and at the worst possible time, for Elroy was soon to be profiled by 'New York Magazine' and Elva was about to begin a two week prima ballerina course with a job already assured her at the Ballet Russe de Monte Carlo. They held a family conference and came across an ad in the Directory for Childmenders.

"What does it say?" Elva asked.

Elroy read: "Is your child losing out on the best of life by possessing an unruly personality? Do you feel frustrated by the problem of giving him/her love without getting swallowed up? Is it all getting a bit much? Then why not take advantage of Childmenders! We will cart away your child and return him/her loving, obedient, docile and easily satisfied—and we will do this without screwing up one bit of his/her individuality, initiative and aggressiveness, so help us God."

"They sound like they give a damn," Elva said.

"Funny you should say that," Elroy said. "Right down here at the bottom of their ad it says, 'Believe us—we give a damn!'"

"That clinches it," Elva said. "Call them up!"

Elixir was carted away, and the Elroys celebrated their new-found freedom by calling up Instant Real Friends and throwing a party with the help of Perry and Penny, the Party People.

Onward the Elroys plunged along the rocky trail of self-transcendence. Unfortunately, this involved a clash of interests. Mr. Elroy was pursuing High Matters through Mindpower. Elva still sought summation in the veritable flesh. They fought about which item in the Directory they should opt for next. Since they had both taken the Supreme

Communication Foundation's Quickie Course in Inexorable Persuasiveness, they were both terrific arguers. But they got on each other's nerves because they were both terrible listeners.

Their relationship fell apart. Stubbornly, neither of them would go to Relationship Repairers. In fact, Elva defiantly joined Negatherapeutics, with its intriguing slogan, 'Hate your way to Happiness.' Elroy pulled himself together and explored his feelings with the revolutionary new Cellular Self-Image Technique and understood at last where he was at: he detested his wife and wanted her dead. It was as simple as that!

Elroy swung into action. He pounced on the Directory and located the Spouse Alteration Service of Saugerties, New York. They came and took Elva away and Elroy finally had time to get into himself.

First he learned how to achieve instantaneous ecstasy at will. This had formerly been an exclusive possession of a few Eastern religious organizations, which until recently, had been the only ones with the telephone number of the service that provided it. Bliss was a lot of fun, but Elroy had to come out of it when Childmenders called to say that his child was irreparable, what did he want them to do with her? Elroy told them to put her back together as well as they could and store her until further notice.

It was at this time, through the assistance of Psychoboosters, Inc., that he was able to raise his intelligence to two levels above genius, a fact that was duly noted in the updated edition of his autobiography that was being serialized in the New York Times.



The Spouse Alteration Service called and said that Elva was the old Unalterable model and could not be adjusted without grave danger to the mechanism. Elroy told them to store her with his irreparable kid.

At last, triumphantly alone, Elroy could return to the joyous work of saying good-bye forever to Mr. Pain. He had it all pretty much together by now, of course, and was experiencing many religious visions of great power and intensity. But something unsatisfactory still remained, though he couldn't put his finger on what it was.

He looked through the Directory, but found no answer. It looked like he was going to have to tough this one through on his own. But then, providentially, the front door opened and in walked a small, dark, smiling man with a turban and all-knowing eyes and an aura of incredible power. This was the

Mystery Guru, who seeks you out when the time is right and tells you what you need to know—if you are a subscriber to the Directory.

"It's the ego," the Mystery Guru said, and left.

Vast waves of comprehension flooded over Elroy. The ego! Of course! Why hadn't *he* thought of that? Obviously, his ego was the final thing anchoring him to the gummy clay of everyday reality. His ego? His very own ego was holding him back, forever yammering its selfish demands at him, completely disregarding his welfare!

Elroy opened the Directory. There, all by itself on the last page he found the Lefkowitz Ego Removers of Flushing, New York..

Beneath their ad was this: "Warning. The Surgeon-General had Determined that Ego Removal may be Injurious to your Health."

Joseph Elroy hesitated, considered, weighed factors. He was momentarily perplexed. But then the Mystery Guru popped into the room again and said, "It's a seven to five shot at the Big Spiritual Money, and besides, what have you got to lose?" He exited, a master of timing.

Elroy punched out the big combination on the console.

Not long after, there was a knock at the door. Elroy opened it to the Lefkowitz Ego Removal Squad.

They left. After that, there was nothing whatsoever in the room except a disembodied voice humming 'Amapola.'

And then even that was gone and there was only the console, winking and leering and glittering at itself, daring itself to flipflop out of existence. •

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DOMINO DOMINE

by Dean Ing

And so on—*ad infinitum*?

Long before he saw signal fires through the great spyglass, Pontifex knew the taste of victory, and of fear. The new land-bridge—conceived in love from heaven, born in the fury of undersea tectonics—was a sword with two edges.

The Presence was no godlet of vague or paltry predictions: He had promised the landbridge, miraculously formed before the Infidel could garrison their coastal city. The steam carts of Pontifi-



cal legions had dashed across baking mudflates to capture the Infidel city in a single day. Soon that city would furnish youths for the Sacrifice of Innocents in accord with the pact between Pontifex and The Presence in the holy flame. Still, it was one thing to capture a city, quite another to hold it against the aroused Infidel.

If the invasion failed, soon the landbridge would be choked in ignominious retreat. The half-trained savages of Pontifical legions would be followed by sturdy yeoman Infidel farmers; one beachhead would go, then another; and soon, like game tiles toppling one against the next, the very redoubts of The Presence might fall. For most of the priesthood, failure of the holy war was unthinkable. For the high priest it was all too thinkable. For, if Pontifex was first among the devout, he was also prone to question. It was a burden he shared with none but The Presence.

Pontifex blinked as he turned away from the eyepiece, caught the eye of his aide. "Flash the message, Delain," he said; "the Infidel city is ours."

Delain, militarily correct, let relief show in his tanned features as he bowed himself out of the observatory. Pontifex often wondered at the wisdom of using a brigade colonel as he used Delain. Yet Delain knew his place, and that of every man in the Pontifical forces. If a signal mirror or a guard or a weapon failed, Delain saw to the replacement without asking instructions. It was a virtue uncommon on this side of the narrow sea, Pontifex thought with chagrin. Unquestioning fidelity to The Presence caused a dependence in men's minds. *It embrittles the soul*, he thought, and quickly diverted himself from this heresy.

The heliograph was already flashing the news to his own city, far below the mountain heights. Before Pontifex could descend his funicular railway to the temple, the message would be shouted to every hovel, would be filtering toward the hill tribesmen and the laboring peasants. And the clattering sulphurous funicular would give Pontifex time to compose himself for audience with The Presence.

The old priest found Delain staring across mudflats toward a twinkling on the horizon. "Some genius with our assault battalions already has his flasher in use, your grace," said Delain, surprised as always at efficiency in the ranks. "Shall I stay here and decode?"

"I shall need you to make ready for the solemn rite," Pontifex replied. "Surely the innocents will be rushed back immediately."

"Even before our wounded, wire," said Delain, his tone making no secret of his disapproval. "Need you rush? We can hardly spare the oil for a mass sacrifice now, of all times." The priest said nothing as he settled his slender old body in a funicular seat; his stare was reproof enough. Delain gnawed his lip. "And I am not a priest, but a fool to meddle in priestly matters," he said, bowing low. The faintest suggestion of a smile tugged at the mouth of Pontifex. Delain saw forgiveness and took a calculated risk. "Or has The Presence revealed how to double our reserves of oil?"

Pontifex engaged the lever that would begin their descent. Always alert, Delain had pinpointed the problem. If they were to proceed with transport of vital troops, it must be within days. The steam carts would need all of their available pro-

cessed oil and much of the wood. Yet the mass sacrifice would use half of the hoarded fuel.

"Be tranquil, Delain," said the old priest over the railway's clacking; "I can only say that the bargain has been struck. The Presence will provide."

Delain sighed unhappily. "I must accept what I fail to understand. It takes many precious barrels of oil to incinerate a thousand children."

Pontifex frowned. He was thinking the same thing.

The innermost temple portal dilated at the voice of Pontifex, who had long ago ceased to wonder at such minor miracles in the sanctum. Soon, replenishing aromatic oil in the crystal flameholder, he had rekindled the holy flame and, in time, was rewarded.

"Rise, Pontifex," said the familiar voice, its gentle thunder thrilling with vibrato. Filling the flame was, literally, the Godhead; and the face of The Presence was beautiful. Wise brown eyes gazed below tight black ringlets. The full beard surrounded a mouth that some might call faintly sensuous, and the mouth was smiling. The face of The Presence could be as cold as ocean depths but on this day it was warm and loving. The flame danced and shuddered as the voice issued from it. "You may speak."

"Victory, Lord," replied the priest. "Our steam carts will return within a day's time, laden with captives. The day after, we will perform the rite."

"Then smile, Pontifex. I am pleased." Yet something in the voice was less than pleased.

Pontifex tried to smile. "I—my aides are troubled, Lord. The problem may be trivial, but the sacrifice

will consume most of our oil reserves. Am I presumptuous?"

"Yes; but you tremble in your presumption. I am not threatened, Pontifex." Then, more sternly: "Not by mortal impudence, in any event. I shall provide."

"Thank you, Lord. Where will we find the oil?"

"You will continue to extract it as always."

"Lord, we proceed at full capacity. Without more oil, we would allow the Infidel time to mobilize and overrun our positions. If our troops lose heart they will panic. And presently, Infidel farmers might sweep into this very sanctum with my blood on their boots."

"Unless diverted by a locust plague in their fields," said The Presence.

Pontifex considered this. "And if they elect to abandon their fields to the insects?"

The face hardened. "The sea bottom shook once to raise your landbridge," it reminded. "Am I impotent to sink it again?"

Pontifex dropped his eyes. "Infinitely potent, Lord. You would do all this?" He did not dare—or need—to ask the fate of the assault battalions in such an event.

"I shall do what I shall do. Two days hence, the mouth of the infinite will attend your mass sacrifice."

Pontifex let his delight show. "May I call the faithful to the temple as witnesses?"

'After the briefest pause: "Even the heavens grow uncertain—but by all means, call the faithful if you like. And now make haste, Pontifex; do not tarry with your women."

The priest sensed, as he had a few times before,

a wry amusement in The Presence. He smiled back as the flame dimmed, its Godhead fading. "My Lord is jealous with my time," he said amiably.

And from the dying flame: "All gods are jealous, Pontifex."

The suggestion of many gods was a heresy so profound that Pontifex took it for a divine jest. The priest hurried to the portal, his confidence rekindled. Perhaps Delain could oversee a massive stockpiling of wood for the steam carts. With piles of wood at waystations along the mudflats? Perhaps. Such questions were below the notice of a god. *All gods*, his mind whispered.

Old Pontifex stood in bright sunlight before the temple facing the vast stone bowl between himself and the faithful throng of the city. He did not permit himself the luxury of a frown as he saw a guard hurl one of the captive children into the



depression. Even though the children had been drugged during meals, they would feel some pain.

And Pontifex was not a cruel man. Far better, he felt, if the children went peacefully into the shallow lake of oil. From his vantage point he saw the piles of wood that already began to dot the horizon. Delain had insisted that only by a miracle would the waystations be sufficient—and Pontifex had agreed with a secret smile.

By now, more than half of the children had slid into the huge oil-filled depression. Most of the city's people were gathered below to witness the ancient holy rite. Or more correctly, they had gathered to behold the mouth of the infinite, the enormous cyclonic void that would form above the blazing pool to swallow the sacrificial smoke.

Once, the people across the shallow sea had made similar sacrifices until some herbalist fool had found means to control the birthrate. It was only a matter of time before this technology became a religious issue, then an enmity; and now the Infidel refused to sacrifice their surplus youth since, they claimed, there was no surplus. This final refusal had provoked the eternal, all-wise Presence. For as far back as records existed, sacrificial rites had always been demanded by The Presence. What right-minded person could deny a deity who so willingly demonstrated His existence?

Pontifex regretted the need to give youthful lives but, in his regret, stepped forward with his torch. The last of the captives stumbled forward into the pool.

And then, incredibly, a group of half-grown children scrambled from the pool, oil glistening

on their naked bodies. They had waited for the approach of the high priest and now flew into an organized pattern of action that suggested careful training. Twoscore of the youngsters fell on the guards, while a similar number sprinted toward Pontifex.

Obviously, the group had refused their drugged food. They had been taught what to expect, could plan independently, were fired with a desperate valor unknown to the ignorant legions they defied. Pontifex stood his ground on leaden feet, unwilling to show his fear. A detached segment of his mind marveled at the display and wondered if Delain were napping behind him.

Delain's response was a barked command. The heavy whistle of thrown spears passed over Pontifex into the onrushing children. Delain led the countercharge, hacking with his shortsword, fending off the pummeling empty hands. Only a lad and a girl, both near puberty, escaped. Oblivious to the screams behind them they drew nearer, until a flung shortsword pierced the boy's side. He fell, sliding in blood and oil, yet the girl did not falter.

Pontifex hurled the torch. The girl staggered, fell to one knee, and in that instant her body was sheathed in flame as the oil on her body ignited. She stood again, faced the priest as he folded his arms in a crucial show of disdain. Through the flames she stared at Pontifex; and in her face he saw a terrible resolve. She managed to reach him, clasped him in fiery embrace.

Pontifex held his breath, slid from his crimson robe as the girl reeled gasping. When she fell, she did not rise again, and Pontifex paused only to

recover the torch before striding to the lip of the sacrificial pool. Though unharmed he was too shaken to pronounce the invocation, but all the city's multitudes applauded as he let the torch roll into the oil below.

The roar of the pyre found its match from a hundred thousand throats; invoking The Presence, drowning bleated cries from inside the smoky inferno. Delain took his position behind the priest, the guards scrambling back from the heat while Pontifex, ritually proper though half unclothed, backed away pace by stately pace.

From Delain, behind him: "The fault was mine, sire."

"Nonesense. Who could expect such resolution from captive children?"

"I could, sire."

"Yes, perhaps you could. A great pity."

"A great waste."

High above them, the mouth of the infinite swirled into being. Roiling greasy smoke arose slowly at first, then thrust itself curling into the vortex that wailed overhead, an enormous invisible maw sucking the sacrificial smoke into nowhere. There were no more cries from the victims, no more hails from the crowd; only the steady cyclonic howl from above. It could not happen, yet it always happened. Therefore it was miraculous, an awesome demonstration of the power of The Presence. Through many tomorrows, thought Pontifex, the devout might fight more faithfully now..

They would need to. As individuals, the Infidel made the superior fighter. Was The Presence, then, a lord of inferiors? This thought would not

subside, and Pontifex knew that its open expression would destroy him.

Gazing aloft, the old priest feared that The Presence had read his thoughts, for the huge mouth flickered from existence, reappeared, wafted from view again. The charnel stench of human sacrifice spread as the smoke continued to rise from the pool of fire. Presently it drifted, a horrifying omen, over the city and its frightened people. Never before had The Presence rejected such a sacrifice.

Pontifex tended the holy flame with trembling fingers, trying to ignore the sensation of ice that lay in his vitals. For a time the flame danced by itself over the carven crystal, uninhabited. At last, when fear overhung Pontifex as the smoke pall overhung his city, there was a swirling in the flame. It bade him speak.

"Lord," he croaked, and faltered. "Lord," he tried again, failed again. Ignoring arthritic pain, the priest abased himself on the cold flagstones. Muffled: "I failed you, Lord."

"No, Pontifex. You have served well."

"But—you refused the Sacrifice of Innocents?" The priest rested on his knees, tears streaking the lined old face.

Something in the hallowed features seemed awry. If a god could register perplexity, it might be registered thus. "The failure was not yours, Pontifex." A wisp of smile. "I was—distracted." It seemed that more was to be said, and then it seemed that The Presence had thought better of it.

"The people call it the worst of omens, Lord. Their fear spreads to the provinces. My aide reports flasher messages from across the landbridge.

Our gains are imperiled, though there is hope." He attempted a summation; could only add, "All is not well here."

"Nor in the heavens. Has it occurred to you that your aide fears to tell you the worst?"

"It has, Lord. Delain fears me too much. In some ways it might be better if I did not pretend to godlike knowledge."

There was a long silence, as the face in the flame studied the troubled priest. Then: "Sufficient knowledge equals divinity?"

"I did not suggest that, Lord."

"No; I did. Pontifex, if you took Delain into your confidence, explained your miraculous wisdom, would he be the better for it?"

Pontifex wondered how he could reply and decided upon total candor. "For himself, probably yes. For my purpose—which is to serve you, Lord—certainly no. Did I answer wisely?"

Something between a chuckle and a sigh. "I hope so. You have served me as your Delain has served you. Even while hating the bloody work I gave you."

"You saw my thoughts, Lord."

"I saw your face, Pontifex."

"The Presence is all-seeing," the priest murmured.

Quickly: "And what if I were not? Is it possible to forgive a god that fails?"

Pontifex felt the tears drying cold on his cheeks, overwhelmed by the deeper cold in his belly. "Lord: a god cannot be a god, and fail."

"True." Softly, with a note almost of pleading: "And I foresee that I must fail you."

Pontifex, misunderstanding, cried out. "What

have we done to deserve your forsaking us?"

"Nothing. The universe takes little note of the deserving poor. Let me reward your devotion with truth: I can no longer maintain the energy source that permits me to interfere with your natural events. I might be an observer; nothing more. Seismic disturbance, plague, even the mass transfer locus you call the mouth of the infinite. All will be lost to me, therefore to you."

Pontifex cast his mind ahead to guess at a future without divine guidance. "The people believe in me, Lord."

"As you believed in me, Pontifex. *As we believed in our gods,*" the voice thundered in savage irony. "*As our gods did in theirs!*"

Pontifex clasped his head between his palms to keep it from bursting. "It is painful to hold such thoughts," he muttered. "Why must you abandon us?"

"Our gods tell us that *their* gods are losing a great war," was the reply. "When we lose assistance from above, those below us must suffer the same fate. Perhaps the universe grows tired of gods."

"Or of wars in their names," the priest said bitterly. "What use did you make of the ghastly sacrifices we perpetuated in your honor?"

The flame steadied as the voice fell silent. When it spoke again, it spoke with reluctance. "A flavoring, Pontifex. A condiment highly regarded by my civilization."

The priest stood erect. "Spice," he whispered. "Can you have been victimized as badly by your own gods?"

"Considering the holy war we seem fated to lose



on several worlds? Oh, yes. Yes, we think so. There may be a spark of the savage in all beings, Pontifex. We defaced our temples. Are you civilized enough to forgive?"

"*Were you?*" With agility that surprised him, Pontifex smashed the crystal flameholder. Small pools of oil spread across the altar and over the stones, feeding blazes that flickered toward ancient draperies.

As the sanctum began to burn, the old priest shed his robes. The portal dilated for the last time, and staring back, Pontifex saw in each flame the same once-beloved face. In unison, the images called to him. "Absolution, Pontifex," they pleaded.

To no avail. Many generations would pass, the burned temple a long-forgotten ruin, before hearth-fires on the peaceful world of Pontifex were entirely free of the voice that begged from the flames. •

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NEWS MAGAZINE

COMES
THE
REVOLUTION,
COMRADES

by
JE POURNELLE
PH.D.

“We’re going to make it,
we’re going to demonstrate
the scientific possibility
of fusion.”



This isn't the column Jim Baen and I had intended for this month. Some time ago, when we were both at another magazine, we conceived the notion of a column on "How to become a space colonist," and that was what we'd hoped to give you this month. Unfortunately an old Greek lady

named Catastrophe intervened.

Larry Niven and I hike; and generally we take a troop of Boy Scouts. This year we'd planned a 50 miles 6-day hike in the High Sierra, and the boys have been training for it all year. This final training hike was several miles up the Iron Fork of the San Gabriel river, which went without incident until, on the way back, we paused for a swim; and while I was getting into the stream I fell and broke my right hand.

Nothing particularly serious. I can testify that the plastic bottle containing the sun protection "Blockout" works well as an emergency splint for the third and fourth metacarpals if you're ever so unfortunate as to need one; I can also testify that first-aid courses should emphasize the importance of removing all rings in cases of fracture: they had to saw off my ring when we reached the hospital. They also turned my hand into a lump of plaster attached to an elbow, making it impossible to type more than ten words per minute.

Worse, notes I make with my left hand turn out to be only slightly easier to read than Linear A. Thus I was unable to do the necessary research for the space-colonist article—and what little I did left no legible tracks. And when, cast and all, I duly attended our long-planned 50-miler I returned to be confronted by the deadline for this column.

Fortunately my computer makes it *possible* to write one-handed, although it's a bit tiring and not very fast; but you'll have to be satisfied with a different column from the one we'd hoped for.

* * *

There were several interesting items in the news

awaiting me on my return from the Sierra. The first is of personal interest: *LUCIFER'S HAMMER* by Larry Niven and Jerry Pournelle is still on the best-seller list. The second has a more universal appeal, although it contains a hooker that's a bit frightening. In my paper it was buried back on page nine, so it's possible some readers missed it; it went this way:

"STEP REPORTED TO LIMITLESS POWER

The Washington Post

WASHINGTON—The attainment of a temperature of 60 million degrees for half a second in a Princeton University laboratory was described Monday as the first step toward a limitless supply of electricity for the world.

"We're going to make it, we're going to demonstrate the scientific feasibility of fusion," Dr. Melvin B. Gottlieb, director of Princeton's Plasma Physics Laboratory said at a press conference held at the Department of Energy. Gottlieb said a demonstration of fusion could occur as early as 1981 or 1982 when the Tokamak Fusion Test Reactor under construction at Princeton will begin to operate. . . .

John M. Deutch, director of energy research for the Department of Energy, cautioned Monday that the Princeton achievement did not change the national timetable for the commercial production of electricity from fusion."

Hopeful news, eh? Gottlieb went on to say that it took seven years to go from 5 million degrees to 25 million, and only six months to reach 60 million. Calling a few other experts around the country

confirmed what seemed obvious: this was a real breakthrough; a rapid advance that hadn't been anticipated.

Moreover, it's an advance others may not have for a while. Although the Soviets are known to be forging ahead in fusion research, Dr. Gerald Yonas, fusion project manager at Sandia, says he'd be much surprised to learn that the Soviets have the neutral beam technology used at Princeton. We will, he says, be able to study high-temperature plasmas, and the Princeton achievement "speaks to the whole prospect of how rapidly we can bring in a new technology and apply it to physics. It wasn't long ago that we were playing with kiloVolt temperature."

Sounds hopeful, doesn't it? But note that last paragraph in the news article.

The breakthrough "does not change the national timetable." Does that seem curious? Here we have an unexpected achievement, something of great importance to engineering physics as well as a capability of prolonged study of phenomena (high temperature plasmas) which formerly were only mathematical concepts—but it doesn't change the national timetable.

Of course it doesn't: there is no national timetable for the commercial production of electricity from fusion. The expected date for US fusion power is never, and thus no breakthrough will bring it closer.

In 1965, 12.6 cents of every dollar spent by government went to support scientific inquiry. The result was to build a great pool of talent and knowledge that we are now exploiting: the US had a near

monopoly on Nobel Prizes in 1977; the sports sections of the newspapers advertise computers available to anyone; we have wonder drugs, digital watches, new health care techniques, plenty to eat. A plethora of wonders pour forth for our enjoyment. Almost all of them are a direct result of our prior investments in science and technology.

In 1975, we spent only 5.7 cents of each government dollar on science. Nor is industry picking up the slack: in 1976 industry put \$38 billion into all aspects of R&D, most for exploitation of discoveries made 10 to 15 years ago. Measured in constant dollars this is a 5% drop from 1968.

At this rate we may well see another newspaper story one day:

"FINAL PLANS FOR REACTOR DELIVERY

Reuters

TOKYO— OFFICIALS of Mitsubishi confirmed today that final contracts have been signed between Mitsubishi and Westinghouse under which Westinghouse will provide support personnel for installation of the Mitsubishi-designed fusion reactor to be installed in Ensenada.

Although the reactor design is by Mitsubishi, the scientific breakthroughs which made controlled fusion possible resulted from work by US research teams, work that was later terminated for lack of funds.

Under previous contract arrangements with Southern California Edison, San Diego Power and Light, and the Los Angeles Department of Water and Power, Mitsubishi will construct the reactor in Mexico and sell the resulting electric power to California. A substantial fee will be paid to Mexico

for allowing reactor construction and the arrangement with Mexico must be renegotiated after ten years. In addition to construction costs, Mitsubishi will receive an inflation-adjusted fee based on the number of kiloWatts produced by the reactor.

Mon. March 25, 1987"

All made up, of course, but might it not happen? At the moment we pay the incredible sum of \$50 billion a year for foreign energy, when it's fairly obvious that no more than \$50 billion invested in space research a few years ago would save at least half that forever; continue with the same lack of foresight and we could well end paying the Mexicans and Japanese similar amounts—with similar disastrous effects on the dollar—to get fusion energy even if it's our technology. After all—the oil technology is ours, too.

Fat lot of good it does us.

But nothing lasts forever. True, the current administration seems enamoured of "soft energies", the kind you get by working your individual can off forking up manure or climbing about on the roof of your house (at least one study has estimated the danger of solar power, per kiloWatt, to be about ten times that of coal and fifty times that of nuclear, and the large number of people who'd have to climb on roofs is not a negligible part of the hazard); true there seems to be a conspiracy of the intellectuals to condemn *any* energy technology that might actually work, so that we may soon expect the intelligentsia to "discover" the hidden dangers in fusion power; but administrations change, and the American people obviously have

faith in our engineers and scientists.

In fact, that's probably Carter's major problem with his energy proposals. He wants us to make do, cut back, use less: to put high taxes on energy in order to force conservation. The American people simply don't believe him. Somewhere, they reason, there is a good hardheaded Yankee (probably with a Slavic or Jewish name) working away in his basement, and before the crunch gets serious he'll trot out a method for producing all we want. Haven't we always done things that way?

The American people don't *want* conservation. We like our big cars and air conditioning, and we think we deserve them.

And "deserve" them or not, we can have them—if we're willing to invest in the future. The investment need not be very large. Less than we spend on booze or cigarettes or cosmetics, and we don't even need to give up drinking and smoking and primping to get the investment funds.

Suppose we make the effort: either through a change in Congress and administration or a change of heart on the part of those in office, we make the investments. Where might we go, and when?

* * *

The first is implied by Dr. Gottfried: breakeven by 1982. For the benefit of readers not familiar with fusion reactors, I'd better explain.

Einstein postulated that $e = mc^2$: matter and energy, far from being different kinds of entities, are simply two different states of the same "thing", and can be converted one to the other. From that equation came the work of Fermi and his "pile" in the squash court at the University of Chicago; that

proved the theory. A more dramatic proof came later with Trinity and Hiroshima, and some years after that came controlled nuclear power.

All this works by fission: a heavy nucleus, such as Uranium 235 or Plutonium 238 is hit just right by a neutron; the nucleus splits to form two new elements, often barium and krypton. However, if you add up the weights of the fission products, you'll find they total less than the mass of the original atom. Some of the mass has been "lost"—it has become energy.

Fusion works the other way. A light element, such as hydrogen, is literally squeezed until its atoms collapse together to form something heavier, such as helium. The mass of the result is a bit less than that of the original hydrogen, and the difference has been converted to energy.

Sounds easy but it's not; the reaction requires enormous temperatures. At 100 million degrees K the hydrogen you're trying to fuse gets active and wants OUT; you've got to hold it in place long enough for the reaction.

There are two ways to accomplish this. One is simply to squeeze the stuff: but there's no material known that can stand those temperatures. The reactor walls will melt long before the reaction can happen. So? Use non-material walls. A magnetic bottle, for example. While you're at it, make the ends of the "bottle" a magnetic field as well, ending with a doughnut-shaped reactor, the best-known of which is called a "Tokamak" (from a Russian acronym). An early type of Tokamak was used at Princeton to achieve the latest breakthrough, and they're hoping that when they get the full-sized reactor they'll get out more energy

from fusion than they put in as heat and electricity to generate the magnetic field.

A second method is "inertial confinement": instead of holding the fusion "fuel" in place for a long time, confine it in tiny pellets and zap it from all sides at once; if you hit it with enough energy the reaction will start and will itself confine the fuel long enough to get energy back out. Things you might zap the pellet with are laser beams, as at Rochester and Livermore and Los Alamos, or electrons and protons as at Gerald Yonas's shop in Sandia.

The inertial confinement programs are moving along, if a bit jerkily. Although he didn't tell me this, I happen to know that Yonas spends about as much time in Washington trying to keep his budget—his program has been cancelled and restarted half a dozen times in the past three years—as he does in the lab trying to make neutrons. At Livermore, where they're building a big glass laser, and at Los Alamos where they're constructing an enormously powerful CO₂ laser, the story's more or less the same: they get their funds, but only after a big fight that consumes a lot of time better put into science and which scares the livers out of the junior scientists, who don't know if they'll have jobs next year or not no matter how successful their work may be.

It wasn't long ago fusion was pure theory: unlike fission which was demonstrated, fusion was theoretically possible but required not mere engineering, but scientific breakthroughs. That's not so true now: it's a very good bet that fusion can be made to work. How long it takes is something else again, for the moment the only workable nuclear

power system is old reliable fission. (And the only alternative to fission over the next twenty years is coal.)

Now we could run the country on fission power, but there are problems. Fission requires expensive fuels, and in fact it's worse than that, because only a tiny fraction of the uranium—itself a rare enough element—that we mine is the right kind of stuff to fission. The rest has to be converted. We know how to do that but the process is expensive, and it's messy as well, producing various radioactive wastes which, although not all that hard to take care of compared to the wastes from coal, aren't trivial either. There's also the problem that fission fuels can without too much ingenuity be used to make bombs, and so it's legitimate to worry about how many nations will join the nuclear club.

No one deep-down believes that fission power is more than a means to get us to the next century. We're lucky to have it, and in my judgment we have insufficiently exploited our nuclear capabilities. But nobody really loves fission; it will always be rather expensive and require expensive fuels.

Though the future looks bright, the situation with fusion is complex. At the moment the only thing we can get to fuse are isotopes of hydrogen: Deuterium and Tritium.

Deuterium is more or less readily available from seawater: for every 6000 atoms of hydrogen in "normal" water there is one molecule of "heavy water" containing an atom of Deuterium, and the cost of separating it out is relatively trivial: a water main only 50 cm (20 inches) in diameter would

supply enough Deuterium to generate the entire world's energy needs.

Tritium, however, is a bit harder to get. It is very rare in nature, and must in general be "bred" by bombarding lithium with neutrons. Lithium is not so rare as to be a limiting factor in the use of fusion, but it isn't common as dirt either.

Moreover, Tritium is dangerous stuff that you don't really want leaking out to the atmosphere, but being nothing more than ordinary hydrogen with two extra neutrons, it's slippery and hard to keep.

The reason for all this attention to Deuterium and Tritium is that we can get a Deuterium-Tritium reaction going at about 100 million degrees, and a Deuterium-Deuterium reaction at not impossibly higher temperatures; while a pure hydrogen fusion reaction (such as takes place in the Sun) requires temperatures and pressures beyond our wildest dreams. Maybe in a hundred years these limits will seem silly, but for now we're stuck with the heavy isotopes of hydrogen.

Fortunately Deuterium (one extra neutron in a hydrogen atom; call it D) and Tritium (T) are vastly cheaper—per kiloWatt/hour of power produced—than uranium, coal or oil. Given now-predictable temperatures and pressures we can liberate so much energy from D and T that it takes only a few grams to produce the energy needed by each of us for a whole year. Contrast that to about ten tons of coal needed per each man, woman, and child (10 billion tons a year for the US alone before the end of the century) and you'll see the advantage. Fusion really does hold out the promise of unlimited power forever.

There are problems, though. For one thing, D-T fusion delivers its energy in the form of fast neutrons, just as fission does. Those neutrons have to be stopped somehow in order to make use of their energy. In practice this is done by surrounding the reactor with a blanket thick enough to absorb the neutrons; and whenever you bombard anything with neutrons you'll get some unwanted radioactive byproducts. Proper design of the reactor blanket—part of it will have to be lithium to breed Tritium—can cut the radioactive wastes to a minimum, but there's no way to eliminate them entirely. Thus we'll have to give thought to what to do with these wastes.

Not that this is anything to worry about from an engineer's view. At the very worst they can be stuck out onto the Mojave Desert and covered with concrete. For that matter, so could the radioactive wastes from present-day fission plants. (Two hundred years' worth wouldn't fill the Superbowl). Despite the scare myths you hear (nuclear wastes remain radioactive for a million years!) the fact is that even fission wastes, after about 600 years, are less radioactive than the natural ore mined to get uranium. But there must be a system to deal with fusion wastes—and we don't have one. Furthermore, the system must be politically as well as scientifically acceptable—and that may take a while.

Thus my pessimism. We could have a scientific fusion reactor by 1983, and a commercial demonstration reactor by 1988; but we probably won't. The political reality is that given permit hearings (it takes over 60 different licenses and permits to start up a nuclear power plant!), inter-

ventions by every "concerned" group you can think of, lawyers getting rich by stuffing their briefcases into the works, and all the rest, we probably can't even get a site *selected* in less than seven to nine years. Thus we ought to be starting now the cumbersome process of site selection and approval if we want fusion power before the end of the century.

And make no mistake: as fusion becomes scientifically possible it will become the target for many who now claim to want it. It will come as a complete and disappointing surprise to a number of environmentalists that fusion will produce nuclear wastes. Suddenly we'll need many more studies, endless studies; there will be demonstrations and disruptions; and fusion will have as many political problems as fission has now.

In fact, one of the items on my desk after my return from the hike was Richard Geis's newsletter (Richard E. Geis, Personal Journal, Box 11408, Portland OR 97211; a highly uninhibited and personal journal of opinions, mostly libertarian; \$3.00 for 5 issues). He too had read the news item about the fusion breakthrough, and had this to say in comment:

"But the thing that bothers me is those incredible temperatures bottled in a strong magnetic field.

"What happens if the magnetic 'bottle' breaks at the wrong time? Is there an explosive expansion of all that contained heat? Given a commercial-size 'bottle' that fails . . . would the released heat melt the facility . . . start fires in the countryside? Create strong air vector currents which would af-

fect local weather? Release harmful gasses from vaporized equipment into the air?

"These are fears and speculations at the moment. Having a 'bottled sun' in the same country—even the same state—does not turn me on. And you can imagine the scare tactics that could be used by the opponents of fusion power. (And there will be opponents—ideological, religious, commercial—who will fear or stand to lose from the introduction of fusion power."

Now if Geis, a reasonable man who is NOT a knee-jerk opponent of technology and cheap power, can raise such worries, imagine what's going to happen when the professional "Amerika Stinks" and "technology is evil" crowd get into the act in a few years.

To answer Richard's objections: what happens if the "magnetic bottle" containing the fusion reaction breaks?

First, understand something: the problem with fusion is not to prevent "runaway reactions", it's to keep the reaction going. The plasma (a very hot ionized gas) in a magnetic confinement reactor is actually very thin, a low-grade industrial vacuum. When it is heated the plasma gets energetic, and the moving charged particles *themselves create magnetic fields*. Thus the flow of gas is unstable, and the gas often "gets loose" and touches the walls of the reactor. In addition, the neutrons released by the reaction blast off molecules from the reactor walls, and these get into the plasma. In both cases the effect is the same: the extra matter poisons the reaction, the plasma cools off, and *the reaction stops*.

Thus, the effect of the bottle "breaking" is to stop the reaction

What about all that tremendous heat stored inside? First of all, unlike fission reactors (which have relatively low temperatures but enormous amounts of heat) a fusion reactor would have a very high temperature but little actual heat—at least in the area where the fusing is taking place. The energy from the reaction is not transformed into heat until the neutrons are intercepted. As for the stored heat, well, what happens to the stored heat in an oil-fired boiler when the fire goes out? The amounts of heat are comparable; an 8000 megaWatt generator doesn't care if the calories come from burning coal, nuclear fusion, or buffalo chips, it wants the same amount of heat to generate the same amount of current. Thus if the fusion reaction stops there's no real difference from the case when a coal or oil burner stops: the cooling pipes carry away the heat.

But what of a "loss of coolant" accident of the sort that worries opponents of fission plants? There the fusion system is in excellent shape. A fission plant has in addition to the fissionables themselves a vast quantity of moderating substance, and this gets just as hot as the fuel elements; it takes time to remove all this heat, and if there's no cooling the temperatures could go up to a point at which the fuel containers melt even though the nuclear reaction has been shut down. Fusion, though, takes place in a comparatively cool-walled reactor, the plasma itself furnishing the heat; the plasma cools quickly; and the whole system shuts down with quite predictable effects.

A commercial-size fusion reactor will almost

certainly be confined in a steel-and-concrete containment similar to those around fission plants, just to make certain that any problems inside *stay* inside. I suppose someone is working on preliminary designs for a complete reactor now. Unfortunately there's no serious effort at that, because we don't have a national commitment to a working fusion reactor; and we really ought to start such work now so that it can all phase together. It would be a real pity if the scientific teams with their really difficult problems got far ahead of the engineers/safety experts/political analysts/public relations types who have to see that the complete system is both safe and *believably safe*.

But that would imply that the government wants cheap fusion systems, and I am not at all sure they do. After all, we're talking revolution, and government workers don't like revolutionaries like you and me.

* * *

Another item awaiting my return was an article in SCIENCE NEWS about Robert Bussard's latest conceptual breakthrough. Bussard will be familiar to old-time SF fans as the inventor of the "Bussard Ramjet," a system for using interstellar hydrogen to fuel slower-than-light starships; Poul Anderson used the concept in *Tau Zero* and Larry Niven has incorporated Bussard Ramjets in many of his stories.

Bussard thinks he could have a working fusion reactor by 1985, and build it for vastly smaller sums than are going into the Princeton Tokamak. His machine looks a bit like a Tokamak, and is a magnetic-confinement system; but it is a very great deal smaller, and isn't designed to last very

long. The SCIENCE NEWS article called them "throwaway reactors" and that's very nearly right: instead of superconducting magnets as used by Princeton, Bussard would use special alloys of copper.

Because the copper needn't be kept at super-cold temperatures, it could be closer to the reaction. Thus the reactor would be smaller, and a *lot* cheaper.

The neutrons would destroy the copper, transmuting part of it into cobalt and nickel; Bussard estimates that his reactors would work for only 30 to 40 days before they would have to go off-line for refurbishing; but they are vastly cheaper than the supercold superconducting reactors, so that a utility could operate a number of them in modular-unit fashion. As one fails another comes on line to continue power generation.

Bussard is no bluesky dreamer. He's a former manager of the laser fusion program at Los Alamos and former associate director of magnetic confinement fusion for the old AEC. He has a doctorate in plasma physics (Princeton) and two engineering degrees, and he was the major force behind the first nuclear rocket program.

But no one wants to try his scheme. The Department of Energy has turned him down every time. The last time, according to Bussard, the DOE rejection paper contained 11 technical or factual errors. According to SCIENCE NEWS "several congressional observers and technicians in the Office of Management and Budget feel that DOE has assumed a very political and adversarial role toward the project, unrelated to any possible merits of the proposal."

And get this: Bussard's initial request is under \$10 million—chickenfeed. HEW spends that between lunch and teatime every day. (To be precise HEW spends 10 million dollars every 80 minutes, day and night 365 days a year.) So why is DOE "lobbying aggressively" against Bussard's proposal?

Because it might work?

* * *

Cheap energy would bring on a revolution. Make no mistake about that. The history of freedom has largely been the history of what mankind could afford: the higher the technology the larger the pie; the larger the pie, the larger the slice even for the worst off. In the wealthy West there are few who work for a "living"; you need not work much in order not to starve. The poorest among us have what Aristotle thought of as the very criterion of aristocracy: enough leisure time to allow study and participation in public affairs.

Cheap and plentiful energy would do far more than that. It would end forever the whole concept of a "lower class;" and by so doing greatly reduce the power and privileges of the bureaucrats and the new power elites—those who are convinced that what's wrong with the world is all those people out there doing things without permission.

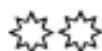
We could see, in our lifetimes, a world in which there are real freedoms, real choices, for everyone on this earth; a world in which no one, simply in order to live, can be forced to submit to indignities.

And that would be a revolution indeed. No wonder, comrades, there are those who don't want to see it.

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THE SPECKLED GANTRY

by Joseph Green
and
Patrice Milton



The old man had a dream,
a dream that had died long ago.



The red-and-gold Florida sun was just above the horizon when Davin Flynn reached his current work-site on the fifth level. Though the cloudless sky promised scorching heat later in the day, it was still cool this early in the morning; he hoped to finish this big patch by noon, then move into the shade. On the way down yesterday at quitting time he had noticed a really rusty area on an overhead beam next to the empty elevator shaft. That would be a better place to work during the worst of the heat.

Davin pulled the wire brush from his left-side wire holster and the paint scraper from the right one. The big steel I-beam he straddled was still moist with dew, hard and cold to a thinly fleshed bottom protected only by worn cotton pants. He started removing rust, scraping hard with the blade and finishing with the brush.

Davin soon noticed that his right arm felt okay today, but the arthritis in his left was getting worse. The linament he faithfully rubbed over arms and legs every night provided very little relief, but he kept using it anyway.

He worked hard for four hours, until he reached an area where the red paint was still firmly attached. His legs were almost numb with fatigue. Slowly he eased himself backward along the beam to the platform, then got to his feet. The over-taxed leg muscles spasmed and knotted; he hastily sat down again and kneaded them with his trembling hands, cursing the pain.

When he could move freely again, Davin opened a rusting can of zinc chromate. With the scraper he cut through the thick layer on top, and checked the contents. Still usable. Just a little thinner . . . he poured paint and linseed oil into his mixing

bucket, stirred vigorously. The gooey yellow-green substance resisted at first, then absorbed the oil and gradually turned fluid.

Davin filled his small can from the larger one and let it hang from the special hook on his belt. Sitting on the beam again, he worked his way out to the clean area and started painting, beginning at the most distant prepared area and working backward. The sides of this beam were barely rusty, and he had not scraped them; he painted both anyway. There was plenty of zinc chromate. He had discovered 400 one-gallon cans in an old POL locker in the deserted Cape Canaveral industrial complex.

It was too bad he couldn't get his hands on some of the "miracle paint" NASA had discovered during the Apollo Program. It had been used on the Golden Gate bridge in the early seventies, proving so resistant to salt and wind that it lasted three times as long as the conventional rust inhibitors. Yes, if he had a hundred gallons of that . . . as it was, new spots seemed to break out as fast as he painted old ones on this ancient steel tower.

"Hey, ol' man, you gonna' fall an' break your crazy head! You got nothin' better to do?"

Davin looked down in annoyance, but it faded when he recognized Leo Welch, Maria's boy. Leo seemed a little different from the other young people. He was one of the few who would listen to an old man retelling the exploits of the Space Program. Most got up and walked away when Davin started talking.

Leo climbed the stairs to the fifth landing, strong young legs making easy work of it. He was naked except for dungaree shorts, bronzed to a

golden brown, muscular and sturdy as a youthful Spartan. The painting he could do, if he could be persuaded! . . . Davin shook his head, telling himself to forget it. No young man with such looks was going to spend his time working when he could be chasing girls instead.

Leo squatted easily on his haunches without sitting on the beam, looking around with interest. "Use'ta come up here sometimes when I was a kid," he said, pointing up at the old Payload Changeout Room. "My buddies met up there; 'sgot a great view. Say, you really done a lot o' work here. Are you keepin' up with the rust?"

Davin grinned at the friendly young man. "More than keeping up. I'm gaining. About another year and I'll be able to start work on one Crawler. After that, at least one check-out bay in the Vehicle Assembly Building." He looked to the southwest, where the giant bulk of the famous old building dominated the flat marshy land of Merritt Island. The blocky monument to Man's first trip away from Earth towered 52 stories high, a rusting monolith, the largest building in the world when it was constructed.

Leo looked doubtful. "I heard you say that before, but you don't ever seem to get caught up here." He looked around, scanning the peaceful water of Mosquito Lagoon to the north, the narrow neck of the Banana River just visible to the south. A freshening breeze blew in off the Atlantic, bringing a welcome touch of coolness. But it also brought salty vapor, the prime enemy of bare steel.

"Mama told me you didn't have any breakfast again this mornin'," Leo went on. "Don't you know that ain't good for you? A man needs his food."

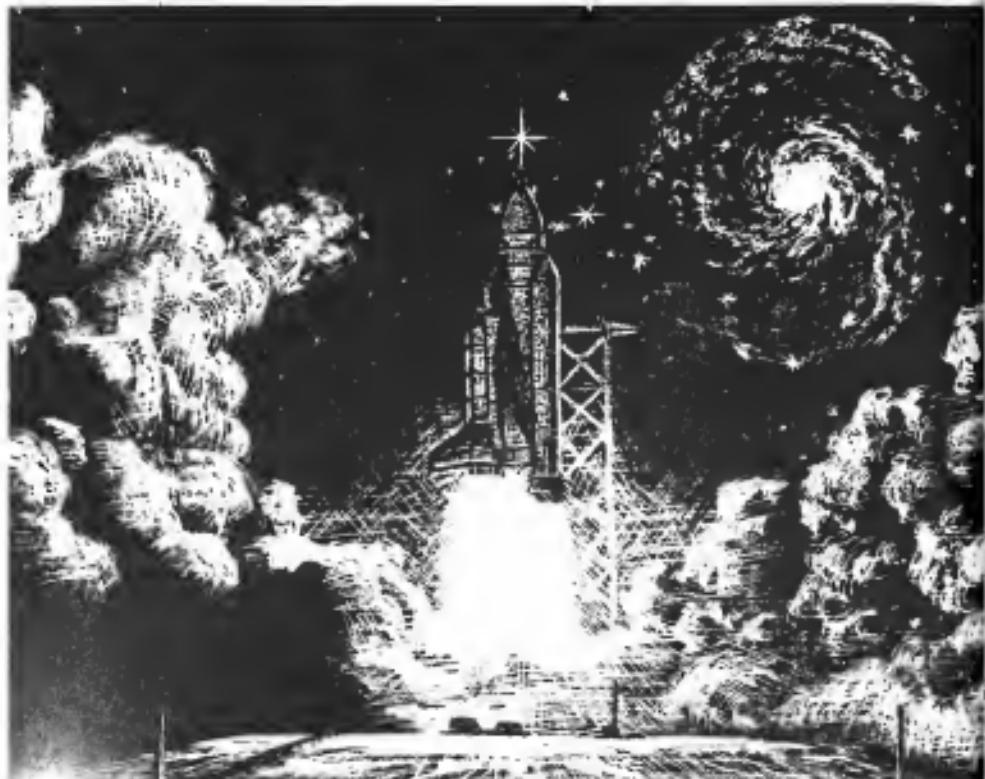
One of the problems of living off the neighbors was that they knew when you ate. Sometimes there were bits and scraps of food in his little shack, more often not. "I wasn't hungry," Davin said, quite truthfully. He was seldom hungry, no matter how little he ate.

"Yeah, but you gotta keep up your strength. I'm going' fishin' this afternoon. You be sure an' get back early, before the rest of the family gobbles it up."

Davin nodded. His young friend was quite right. To work, he must eat.

"You been scrapin' and paintin' on this old tower a long time now," Leo went on earnestly. "Why you botherin'? The Space Program ended before I was born. It ain't comin' back."

"Don't you say that!" Davin's voice held real anger. Leo looked away and shrugged. The older



man softened his tone. "Believe me, Leo, someday one of the Space Shuttles stored in the VAB will be sitting upright on a Launcher Platform again. You'll live to see the mighty Crawler lift up the Platform, Space Shuttle and all, and bring them both to this pad. The computers will hum with their millions of data bits flashing back and forth, the oxygen and hydrogen tanks over there will be filled, and the old pumps will send the supercold fluids pouring into the Shuttle's expendable big tank. Someday men will again walk on the moon!"

Leo gave him a troubled look, one Davin had no difficulty interpreting. It said he was sixty-eight years old, maybe senile, a useless old fart who climbed around this abandoned steel wreck every day when he should be fishing instead. All the decaying equipment at this scene of past glories was falling down around his ears, while he tried to stop the onrush of time with a little scraping and painting. The Space Program was long dead. He should let it rust in peace.

"Well, I got to go. Don't you fall, now." Leo rose with muscular grace, and headed down the stairs. Davin saw one step bend beneath his weight. Leo nimbly hopped to the side, walking near the risers for the rest of the way.

Davin sighed. That rotten stairstep was chrome yellow. He had cleaned and painted it long ago.

Forcing himself to his feet, Davin stretched the stiffness out of his old joints. Then he carried the equipment and paint to the second floor deck, and started work on the rusty floor beam overhead.

He scraped and painted for the rest of the day,

scarcely noticing he had missed lunch again. An hour before sunset he stopped. His hands were trembling so badly he could no longer hold his tools. That was due to lack of food, not fatigue alone. He placed paint cans and tools in an equipment room on the first floor and headed home, walking.

A few hundred yards north Davin stopped and turned, looking at the odd shape of the old Rotating Service Structure, the very special gantry designed for Space Shuttle launches. It was speckled from top to bottom with yellow-green blotches of zinc chromate. The tower that reared up adjacent to it was from one of the three Mobile Launchers used in the Apollo Program. It had been shortened, modified, and permanently installed at the pad for Space Shuttle launches.

The Launcher Platform now sitting on the pad was so large, he remembered, that tour guides pointed out to visitors how a baseball diamond could be laid out on one. The enclosed base itself was two stories high. It too had been adapted from the older Mobile Launcher.

The gantry looked as though it had contracted some form of mechanical leprosy, but at least it was still whole. Left to the unloving rain, sun, and salty wind, it would have fallen by now. He alone had kept the skeletal tower erect. It waited with mechanical patience to embrace another Space Shuttle, to hold the shuddering, fire-belching creation of Man's most advanced scientific knowledge in tender embrace. It waited to be brought back to life and use.

Davin turned away and walked north, eyes wet . . . and heard a familiar humming, whistling sound, followed by a hollow *thwaack!* A low heavy

body burst from the brush almost at his feet, squealing madly. An arrow protruded from the hog's side. Another *thwaack!* sound, and a second arrow sprouted just below the black pig's thick neck.

The panic-stricken animal ran directly into Davin, knocking him down. Before he could regain his feet three bronzed young men had jumped from concealment, one with bow drawn back. The third arrow missed. The wild pig kept going, disappearing into thick brush fifty yards away.

The hunters ran fleetly after their prey. Davin tried to roll out of the way, but only succeeded in tumbling into the legs of the leader. He went down in a heap, and the second one then tripped over the two of them.

The third hunter, a little behind his companions, managed to leap over the tangle on the ground and keep going. He started around the brush pile concealing the hog.

Davin was hauled roughly to his feet, held erect before an angry young face. "Why the hell you always in the way, old man? We coul'da got that pig if he hadn't seen you comin' and hid!"

"I'm—I'm sorry! Didn't know you were here!" Davin managed to gasp. The bronzed giant shook him until the old shirt tore, letting Davin fall to the ground again.

"You're useless, old man! You don't hunt, you don't fish. I ought'a save the people from havin' to feed you." He fondled the hilt of his knife suggestively.

Davin knew this young man well, as he knew them all. Cory Desar, the son of the headman, was quite capable of murdering him and tossing the skinny corpse into the brush to feed the hogs.

"Please don't, Cory. My work—I have to keep the gantry in good shape. We'll need it again some day! Don't—please don't hurt me."

"Oh, you and that damn useless junkpile!" The anger was replaced by contempt and disgust. "It's dead, stupid! Don't you know we're never goin' back to that kind of life?"

"Hey! I found the pig!" came a distant shout, followed by a shrill squealing, abruptly cut off.

"Tomorrow morning I want to see you goin' out with the fishermen. Or tomorrow night you don't eat." Cory saw the stricken look on Davin's face, and the hard expression softened slightly. "Listen, Granpop, I know you're the last one left here who actually saw the big rockets flamin' off into nowhere. But those days are gone, man, gone forever. Don't you know we wouldn't build things like that again even if we could?"



Cory turned and started after his companions, breaking into an easy lope. His type would as soon run as walk.

It was still a half-mile up the coast to the collection of shacks Davin's little group called home. Most of the adults were coming in from the daily hunt for food as he arrived. All hands but his were filled with the usual clams, oysters, swamp cabbage, and horse bananas. They would be glad to hear there would also be roast pig.

Davin looked toward the Welch shack, and saw Leo cleaning a large trout. Several more were roasting over an open fire. He walked that way, sitting down on the wooden bench outside the flimsy structure.

Marie Welch gave Davin a tired smile, and served up a plate of fish and cabbage. He ate mechanically, not caring about the taste. It would give him strength for tomorrow.

In 1976, while the USA celebrated its great heritage of freedom from both need and bondage, Davin had stood on Cape Canaveral and watched demolition experts shatter two old gantries no longer in use. That fateful image had gone out on national television news, and from there around the world. Davin had stood, tears in his eyes, and made himself a solemn promise: No such desecration of Mankind's highest achievements should ever happen again.

Davin looked south to the splotchy tower, standing tall in the evening twilight. This visible symbol of the apex of human civilization had to be preserved. Tomorrow he would tackle that really bad area where the roof had almost rusted through on the upper deck. Tomorrow .

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WHY GO INTO SPACE

by G. Harry Stine

"Why go into space?" That question has been asked by many people who really do not understand why the United States government "spent all that money in space." Actually, the money was spent on Earth because there is no place to spend

money in space . . . yet. But the answer usually is, "For scientific research." Most people are willing to admit that scientific research is a good thing, provided that it doesn't cost too much. But they have frankly indicated that there is a limit to the tax revenues that should be given to scientists for what appears to be the pursuit of scientific hobbies, particularly when there seem to be other more apparent and immediate uses for the money.

The real justification for the Apollo manned lunar landing program was political with scientific research and technological development as secondary rationales. And the Apollo program did not easily survive in the political arena long enough to complete its originally planned activities.

Well, then, why go into space? Are there any valid reasons for doing it at all? Why shouldn't we just sit here on our comfortable planetary home and try to make the best of that?

Surprisingly, there are a lot of reasons that have been proposed over the years. Some of them are short-term in nature; others have a long-term philosophical set of goals.

A search into the literature of space flight—astronautics, science-fiction, and philosophy—revealed at least twenty-six reasons for going into space. There are probably more of them. The literature is now extensive. There may be some that I have missed.

However, making a laundry list of all the expressed reasons for going into space can be beneficial. One may find rationales that had not been considered before. In addition, it becomes possible to better understand the motivation of space advo-

cates ranging from astronauts to young readers of comic strips.

It is doubtful if all these space rationales have been compiled and presented together before. They are fascinating to consider. And each of them has its own compelling justification.

1. Exploration and Research:

This is the most commonly expressed space rationale. "Science" has been defined by the late Dr. W. O. Davis as "a series of successively better approximations to reality." And H. L. Schwartzberg proposed that "the validity of a science is its ability to predict." Thus, to build a better approximation to reality and to be able to predict the many possibilities of an uncertain future, one requires good scientific information. Exploration, searching, research—these are all part of the world of science. They are done for their own sake because of the ultimate value of the information. Those who embrace this space rationale believe in the worth of adding information to the storehouse of our total knowledge of the universe in which we live. With knowledge, we can become more effective in predicting future events and determining the courses of action that may be open to the human race should these events come to pass. This rationale provides the drive behind those persons who advocate that the first priority of a space program should be exploration and research.

2. Relieve the Terrestrial Biosphere:

Since mankind first began to use fire, our environment has been altered from the natural surroundings in which our ancestors developed. The

use of fire permitted the conquest of climate and the foundation of industrialization. But the consequences included the release into the natural environment of combustion products that might not otherwise have been present. Some people call this "pollution," but we must be careful to define what is meant by that word. Waste products are not always pollution. In brief, pollution is that energy or matter left over from our human activity that cannot be easily or naturally absorbed within a reasonable time by the natural environment. At a certain level of density and quality, waste products become pollution. As our human use of fire has become more sophisticated, resulting in the rising pyramid of industrialization, we have created some waste products that do not exist and never have existed in the natural environment . . . and there are no mechanisms that permit their absorption into the terrestrial environment. If, in the long run, we wish to restore the earth's biosphere to something akin to the conditions of the late Pleistocene Period during which the human race evolved physically and psychologically, we are going to have to remove as much industrial pollution as possible from the biosphere.

But we cannot dismantle our industrial infrastructure and go back to the cave and the tree, nor would we wish to do so. Therefore, we must put our industrial operations in a location where they cannot impact the biosphere. This place is space. By going into space and taking our industrial operations with us, this rationale states that we can allow the future growth of our industrial infrastructure without affecting the biosphere with either waste products or waste energy. Both in-

dustrialists and environmentalists can understand and embrace this rationale.

3. Obtain New Material Resources:

In the past decade, there has been an obsession with doomsday forecasts indicating that we are running out of the basic raw materials that support our industrial infrastructure and therefore our civilization. However, nearly all of these forecasts failed to consider that our planet is only one celestial body among nine solar planets, thirty-four planetary satellites, four major planetoids, an estimated 40,000 minor planetoids, and uncounted numbers of comets, meteors, and other space debris. This space rationale suggests that we may be able to eliminate altogether the mining of terrestrial raw materials by utilizing the raw materials available within the Solar Systems using the technology we now have or that is within our grasp in the near future. Right now, such a rationale is too expensive to consider, but space transportation costs will decrease as space technology progresses. Eventually, it may indeed be more economical to exploit extraterrestrial materials, so this is a long-range space rationale that will become short-term as technology permits.

4. Obtain New Energy Sources:

Two centuries ago, we had to give up using an age-old energy resource for major domestic and industrial purposes: *wood*. The reason was simple: Wood was being consumed faster than it could be naturally replaced. We shifted to fossil fuels—first coal, then petroleum and natural gas. Basically,

this amounted to using stored-up solar energy that had been waiting for millenia. Now, we have faced the reality that these are non-renewable energy sources and that we will use them up . . . perhaps in decades, perhaps in centuries, depending upon which forecaster one believes in. Regardless, we must eventually shift to renewable resources.

There are only two that we know of, and both are fusion-based: the Sun and human-made fusion reactors. We do not yet fully understand how to utilize fusion as an energy source, much less how to build a fusion reactor. But we do know how to utilize solar energy and are doing so every day. Therefore, barring a serendipitous fusion reactor breakthrough in the very near future, solar energy will be exploited first.

There is one thing that is clearly available by going into space: constant, unfiltered solar energy. No day-night cycle. No terrestrial atmosphere. A major driver for future space activities now appears to be the solar power satellite. This would convert solar energy in space to a form suitable for transmission to the earth's surface where it would be converted to electricity for distribution on existing or planned electrical power grids.

Space also offers the safety of distance. As our energy needs have increased, so our energy sources have become more powerful and more hazardous to people and to the biosphere. If we are to harness new renewable energy sources such as fast breeder reactors or fusion reactors, common sense dictates that these devices should be sited in space where an accident will not affect mankind and the biosphere.

5. Provide Better Communications:

This is a space rationale that is already a reality. Arthur C. Clarke calls it the creation of "the nervous system of mankind." Few people realize that in little more than a decade of time, the use of space for communications has totally changed our world. Space is necessary for communications because, with the exception of a very restricted low-frequency portion of the electromagnetic spectrum, communications carrier beams travel in straight lines . . . and the Earth is spherical. Space provides the high view, permitting a single satellite transmitter and receiver to cover an entire terrestrial hemisphere.

To forestall the possibility of general war, to promote peace, to improve communications between people on a worldwide basis, and to permit better education of people, our progressing civilization requires more communication, better communication, and easier communication between people regardless of the physical distances between them. There is also an increasing need to transfer information between our new electronic servants, the computers. When you can talk together, you can walk together toward solutions to common problems.

6. Monitor Our Planet:

This is another space rationale that can be classified in the general category of "obtaining the world view from space." Only from space can we view our planet as the entity that it is. This space rationale is already being implemented with various earth-viewing satellites—earth resources

satellites and weather satellites. This rationale further states that, if we are going to manage our home planet better, we must be able to measure and monitor it. From space, we can observe weather trends and even measure the earth's atmosphere. We can observe both land and water crops and from these observations determine how to provide more food. We can also locate and identify sources of inadequate waste management that lead to pollution. And this view from space can also give us a better understanding of and control over other factors affecting the biosphere.

To paraphrase Lord Kelvin, the famous British scientist, "When you measure, you know." It has been only in the last decade that we have really recognized the fact that we do indeed live on a planet. And we have also discovered that we know very little about that planet because we have never been able to measure various factors on a worldwide basis within a short period of time. By going into space, we can do this, according to this rationale.

7. Relieve Population Problems:

Shipping people off the Earth to living quarters elsewhere in the Solar System—on planetary surfaces, below planetary surfaces, or in habitats built in space—has been a controversial space rationale for decades. With the amazing reproductive propensity of the human race, it probably cannot be done with existing or anticipated space transportation technology. Future technology could make it possible. Mass migrations from Europe to the Americas over a period of some three hundred years did not reduce the population pressures in

Europe except on a short-term basis. Frankly, this is a questionable space rationale, even with highly advanced space transportation. If the human race breeds at its current rate and develops the ability to ship its surplus population into space, calculations indicate that within a couple of centuries the human race would be expanding outward as a solid mass of protoplasm at the speed of light.

But it is an existing space rationale.

8. Provide Additional Food Resources for Earth:

With an increasing world population requiring an increasing amount of food and desiring an increased nutritional diet, one can rationalize that it might be possible to grow food either in very large agricultural satellites, on planetary surfaces, or below planetary surfaces. Astro-agriculture is beyond the scope of existing technology, which is to say that we don't know how to do it today. But it might become an important space rationale in the future when technology progresses to the point where it becomes feasible and economical to do this. We will undoubtedly learn how to grow food in space to support people who live in space. But it is not a space rationale that would convince us to do it now. It is long-term, and it is even questionable as a long-term rationale. This could change.

9. Defend Our Nation:

In spite of the fact that there is a United Nations' treaty covering the peaceful uses of outer space and a U.N. treaty prohibiting the placement of weapons of mass destruction in orbit, these are really just pieces of paper setting forth the details

of a current agreement. There is no treaty in the historical records that has remained unbroken, inviolate, or unchanged for one hundred years. Conditions change. Technology advances. The agreement may become unenforceable. Or someone may decide that it is worthwhile to break the agreement for his own purposes. So the space rationale in this area states that we must go into space to defend ourselves against others who might use some of the advantages of space contrary to our interests. Space can be used and is being used for reconnaissance, for peeking over closed borders, and for keeping track of the other guy. Space is also the military equivalent of the high ground. Orbital and lunar military facilities make use of the naval doctrine of the "wind gauge"—i.e.: getting upwind of the adversary in an engagement. Military doctrine also includes the concepts of denial—keep a potential enemy from occupying a strategic location. The whole subject of the military utilization of space has received little or no public attention or debate for over fifteen years, but this does not mean that a military space rationale is not real and strong. This rationale points out that there are strategic locations and positions within the Earth-Moon system because of the strong gravity field of the Earth, the weaker gravity field of the Moon, and the negligible gravity field of certain orbital locations such as the Lagrangian points 60 degrees ahead of and behind the Moon in its orbital path. These gravity fields are akin to wells of various depths. If one person is located at the top of a well and another person is at the bottom of a well, and if both people have rocks to throw at each other, which

person stands the best chance of getting hurt? This is a real situation in the Earth-Moon system. But the defense rationale is almost totally ignored by both space advocates and opponents.

10. Keep The Peace:

This space rationale is allied to the previous one. Proponents would recommend such activities as placing either national or international military facilities in space to enforce peace on Earth using the recent military logic developed since World War II: the threat of overwhelming retaliatory action and post-strike against any aggressor. This goes contrary to the various United Nations' treaties, of course. Historic analogies include the "showing of the flag" by naval vessels in foreign ports or the gunboat in the harbor to protect citizens against foreign threats. Some may view this space rationale as a "space NATO."

11. Provide Nighttime Illumination:

It is quite within the capabilities of existing technology to place in orbit around the Earth large reflector satellites to act as mirrors for sunlight, providing nighttime illumination for cities or for specific areas of cropland during a harvest. Such nighttime illumination could also be useful during disasters and emergencies. These "lunettas" or "little moons" would be able to provide light equivalent to several full moons. It is even within our technical capabilities to orbit reflector satellites large enough to reflect enough sunlight onto agricultural areas to permit round-the-clock growing of crops. Such "solettes" or "little suns" might be useful in regions with short growing seasons.

Suggestions have been made that solettes could provide enough reflected solar energy to the ground to permit 24-hour use of solar energy systems on the Earth's surface. Lunettes and solettes are short-term space activities. It could be done within a decade. But some Kentucky moonshiners might not like them . . .

12. Produce New Forms of Entertainment and Recreation:

The production of motion pictures and television shows in the weightlessness of orbital facilities may open up entirely new forms of entertainment. The decreasing costs of space transportation will make it possible to go into space to produce a number of special effects in weightlessness; it may even be cheaper in the future to make these special effects in space than on the ground. Sports and games in the weightlessness of space are also a possibility once low-cost scheduled travel into space becomes a reality. Developed nations are more anxious to support and able to support such activities as this, and such activities may provide outlets for aggressive tendencies in advanced cultures which repress such activities. Space tourism becomes a reality as soon as space transportation costs come to within a factor of two of ocean-going cruises and present overseas vacation jaunts. This is a near-term rationale, and it may not be as trivial as it first appears.

13. Production of Space Materials:

The environment of orbital space—weightlessness, high vacuum, wide available temperature ranges, and available sources of

radiation—offer the promise of entirely new industrial processes leading to new products that cannot be made at all on Earth or products that can be made better in space because of these environmental factors. Even some existing products can be made in space, and the relocation of production facilities into space would help relieve the biosphere. Historically, the development of new industrial processes—whether it be fire-hardening of wood shafts, alloying copper and tin to form bronze, or complex petrochemical processes—and the availability of new industrial environments have led to new products, new markets, and new human requirements that did not exist before the processes and products became available. These have always led to a general increase in living standards, as improved quality of life, and explosive expansion of activity in the arts. This is a near-term space rationale; basic research, experimentation, and market forecasts are already under way. This space rationale has an economic driver.

14. Improved Navigation and Location:

The high view of the ground has always improved our ability to get from one place to another and to locate things. The high view of Earth from space permits location of any person, animal, or vehicle on the surface of the earth for purposes of detection, security, control, rescue, ecological study, etc. It also becomes possible to steer vehicles such as ships and aircraft to a greater degree of precision and to prevent them from becoming lost. Current technology would also permit the hour-by-hour location of such small items as pack-

ages and parcels using a very small radio transmitter in the package and a very large locator satellite in orbit. This is also a near-term space rationale and one that is already being accomplished to some extent. Along with the other "high view" space rationales, it can produce some outstanding benefits.

15. Spread the Seed of Humanity:

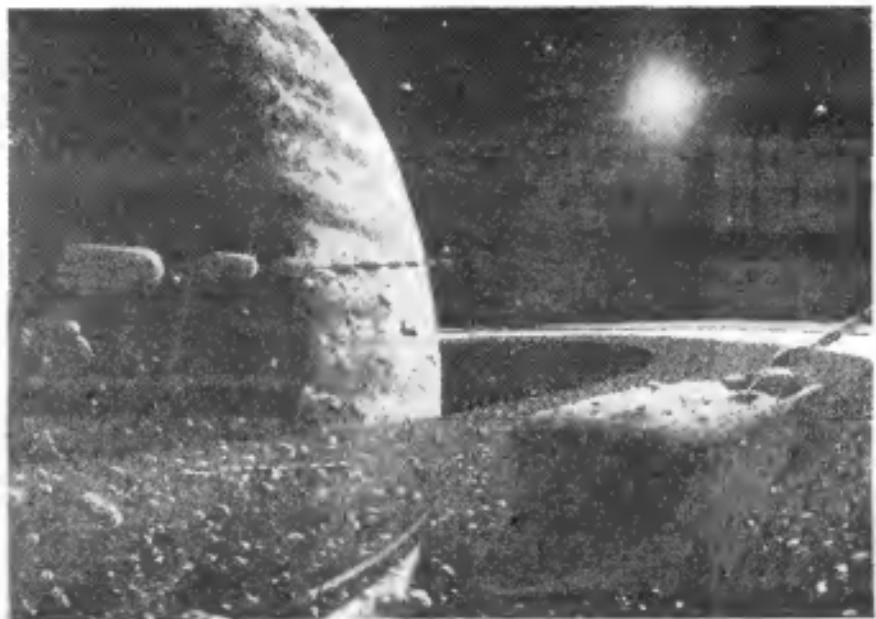
As inhabitants of a single planet around an average Class G star in one of the spiral arms of the Milky Way galaxy, the human race faces the possibility of extinction as a result of any one of a number of astronomical or other cataclysms. If we ever slip back into the dark Ages, we would do so with our fingers on the thermonuclear triggers. It is conceivable—but not quite possible with existing technology—that we could destroy the terrestrial biosphere. Natural planetary disasters themselves might spell the end of us. Our Sun appears to be reasonably stable, but we have studied it for only a few hundred years, a mere blink of the cosmic eye. Changes in the Sun's output could spell disaster. An unstable star nearby could explode into a supernova, showering us with deadly radiation. By expanding into space in a continual diaspora, we would insure the future survival of our species. We may indeed be nothing more than the vehicle for spreading the seed of a self-aware life form throughout this corner of the universe. This is a long-term space rationale. It is one with high purpose and with the elements of survival involved. The survival trait is very strong in terrestrial life, and this very trait may indeed be the one driving us into space. Once free of this planet, we would



no longer be subjected to extinction due to planetary forces or human folly. Once we are star travellers, our species will have achieved a form of immortality.

16. Search for Extraterrestrial Life:

If ours is the only planet that supports life, there are profound philosophical and religious implications to this knowledge. And there are equally profound implications if Earth is *not* the only place where life exists. One way or the other, the answer to the question of whether or not there is life elsewhere will have major long-range effects on the future of the human race under any circumstances. It is a long-term space rationale, but one that is already driving us to land on other planets and to search the heavens for signs of life



elsewhere.

17. Search for Extraterrestrial Intelligence:

Are we alone in our ability to perceive the universe? Are we alone in our ability to use both deductive and inductive logic, to synthesize concepts, to alter our internal programming to meet new challenges, and to solve problems? There are also profound philosophical, religious, and ethical implications if we are the only intelligent, self-aware life form in the universe . . . and equally profound implications if we are *not*! Our ability to even ask this question, "Are we alone?" implies that we are willing to search for the answer. And the answer, whatever it may be, portends our future. This long-term space rationale is already driving us to search. To continue the search, we must go into space.

18. Occupy the Space Ecological Niche:

All known forms of terrestrial life—which is the only form of life we know of at present—expands into or mutates to fill an available ecological niche, a portion of the total environment not currently occupied by any species and one whose occupancy may help insure the survival of the species. Mankind has filled all the available ecological niches on Earth. We now know that people can live and perform in space using our tools and our highly sophisticated ability to take our natural environment along with us. Space therefore reveals itself as a new ecological niche that we can occupy. True to our heritage, this rationale contends, humanity will expand to fill this ecological niche in a very rapid fashion since genetic mutation is not required. According to this space rationale, we're only doing what comes naturally.

19. Epistemology and Religion:

For centuries, we have been searching here on Earth for answers to such questions as who we are and why we think the way we do. These answers may not be available on Earth, this space rationale states, and we may therefore have to go into space to find the answers and to seek meaning and/or God. In nearly all religions of the revelation type, the gods or God came down from the skies. Therefore, perhaps we should go into the skies and beyond to seek God or the gods. Perhaps what we are really searching for is The Meaning Of It All which we may discover out there somewhere because not everyone can agree whether or not we've already found it here. This is the long-term search for The Ultimate Answer.

20. Escape:

The last physical frontiers on Earth are effectively gone. There is no place left where one can go to escape war, taxes, debts, police, coercion, or other personally obnoxious aspects of the particular culture one finds one's self in. There is no place left on Earth to go and get a fresh start. There is no place left on Earth where one can go to improve one's lot and the lot of one's children. There is no place left on Earth where one can go to escape a totally untenable psychological situation. But, says this space rationale, we can now go into space, a new frontier to escape to. Space is the ultimate escape short of suicide. This space rationale is a very powerful, romantic, utopian reason for going, and we see it prominently displayed by the young people around us who may not fully recognize it as this rationale. It may have driven our forebears from Europe to America and from the original Thirteen Colonies westward into the Great Wilderness . . . and it may be the rationale that really drives us into space.

21. Control of People:

If one could control space out to the Moon and the lunar Lagrangian points, one might be able to control people on Earth. This could be done by threat of force applied from space. Or it could be done by propaganda from communications satellites of growing complexity, power, and sophistication. Or it could be done by controlling the every move of very large numbers of people using a large number of data channels through satellites, a technology well within our reach. Through earth

resources satellites, it would be possible to forecast and control food supplies. In short, utilizing known or anticipated technology, it would be possible to exercise complete political and/or economic control over the entire world population from the high ground of space. This sort of space rationale appeals to a surprisingly large number of politicians, bureaucrats, rulers, dictators, and other "men on horseback" who heed the clarion call of power over people rather than the music of power over things. There is a disturbing side to this space rationale: the types of people who would embrace it are those who have the power to levy and collect taxes and then spend tax revenue to make it happen in the foreseeable future. George Orwell didn't even consider this possibility!

22. Politics:

The Apollo manned lunar landing program of the United States was not motivated by scientific curiosity; it was motivated by politics. This space rationale looks upon space as an arena of assistance to foreign policy, dazzling of the population, and a way to channel appropriations of tax money into political districts to insure retention of political power. It is the space game that has been played for a quarter of a century by both the United States and the Soviet Union, each with its own unique interpretation consistent with its system and goals. Whether or not this space rationale is a prime driver remains to be seen. After all, it has historic roots; rockets were originally fireworks, and fireworks displays were used by royalty to impress their subjects with the royal power.

23. Justification of Beliefs:

There are some people who would go into space to prove a point or to justify their beliefs or actions. This takes the form of the petulant statement, "I do indeed have a new space drive/invention/system/way of life/religious revelation that is workable and true, and I will prove it to the world by going into space to do it or display it or practice it because *they* won't let me do it here on Earth!" This has driven people to the frontiers in the past, and it could do so again in the future.

24. The Mallory Syndrome:

This is the classic rationale for doing anything and everything when one does not really understand why one wishes to do it at all. It alludes to the statement of G. L. M. Mallory, the British mountaineer, when asked why he wanted to climb Mount Everest; he replied, "Because it is there!" To people who embrace this space rationale, astronomy is a self-justifying activity. It is to be done for its own sake. Since it is there to do, do it. And don't bother to ask or wonder why. Human beings do many things because of the Mallory Syndrome, and they rationalize in the most amazing ways. In all probability, the Mallory Syndrome perhaps accounts for a great deal of the progress made by the human race. You don't always have to know *why* you want to do something; you must simply want to do it badly enough.

25. Answer the Call of Destiny:

This is not the Mallory Syndrome. It is a rationale that states: we know we are here, and we



think we know where we came from, but we do not know where we are going and why we are going there any more than we know why we are here at all. But, by going into space, we heed some existential, evolutionary call toward our final destiny as humans. Perhaps it is some inner genetic message of the same sort that caused fish to leave the oceans and become amphibians capable of living on the land. We don't know what our destiny as a species is, and we would hope that it is a high destiny. Going into space must therefore be a part of it because we appear to be driven to space by unknown factors. Perhaps the real rationale for going into space is "because that's where the action is going to be."

This list of twenty-five reasons for going into space is almost certainly not complete. But it is probably the first time they have been compiled and briefly discussed. Some may appear today to be compelling, while others may seem to be trivial, negative, or even unthinkable. But times change. The rationales of current acceptance may not and probably will not be those of tomorrow.

From the pragmatic point of view, however, history indicates that our human ascent from this planet will proceed as follows:

The universe beyond our planet is there. People can travel in it and can live in it. Q.E.D.: people will do it. They may then try to figure out why they did it in the first place. According to Robert A. Heinlein, "Man is not a rational being; he is a rationalizing being."

There is another certainty: If Americans do not do it, somebody else will . . .

●

No question about it.

TO BE OR NOT

by Ben Bova

Year: 2007AD

NOBEL PRIZE FOR PHYSICAL ENGINEERING: ALBERT ROBERTUS LEOH, FOR APPLICATIONS OF SIMULTANEITY EFFECT TO INTERSTELLAR FLIGHT

OSCAR/EMMY AWARD: BEST DRAMATIC FILM, "THE GODFATHER, PART XXVI"



PULITZER PRIZE FOR FICTION: ERNESTINE WILSON, "THE DEVIL MADE ME"

Al Lubbock and Frank Troy shared an office. Not the largest in Southern California's entertainment industry, but adequate for their needs. Ankle-deep carpeting. Holographic displays instead of windows. Earthquake-proof building.

Al looked like a rangy, middle-aged cowboy in his rumpled blue jumpsuit. Frank wore a traditional Wall Street vested suit of golden brown, neat and precise as an accountant's entry. His handsome face was tanned; his body had the trimness of an inveterate tennis player. Al played tennis, too; but he won games instead of losing weight.

The walls of their office were covered with plaques and shelves bearing row after row of awards—a glittering array of silver and gold plated statuettes. But as they slumped in the foamchairs behind their double desk, they stared despondently at each other.

"Ol' buddy," Al said, still affecting a Texas drawl, "I'm fresh out of ideas, dammit."

"This whole town's fresh out of ideas," Frank said sadly.

"Nobody's got any creativity anymore."

"I'm awfully tired of having to write our own scripts," Frank said. "You'd think there would be at least one creative writer in this industry."

"I haven't seen a decent script in three years," Al grumbled.

"Or a treatment."

"An *idea*, even." Al reached for one of his nonhallucinogenic cigarettes. It came alight the instant it touched his lips.

"Do you suppose," he asked, blowing out blue smoke, "that there's anything to this squawk about pollution damaging people's brains?"

Frowning, Frank reached for the air-circulation control knob on his side of the desk and edged it up a bit. "I don't know," he answered.

"It'd effect the lower income brackets most," Al said.

"That *is* where the writers come from," Frank admitted slowly.

For a long moment they sat in gloomy silence.

"Dan!" Al said at last. "We've just got to find some creative writers."

"But where?"

"Maybe we could make a few . . . you know, clone one of the old-timers who used to be good."

Frank shook his head carefully, as if he was afraid of making an emotional investment. "That doesn't work. Look at the Astaire clone they tried. All it does is fall down a lot."

"Well, you can't raise a tapdancer in a movie studio," Al said. "They should have known that. It takes more than an exact copy of his genes to make an Astaire. They should have reproduced his environment, too. His whole family. Especially his sister."

"And raised him in New York City during World War I?" Frank asked. "You know no one can reproduce a man's whole childhood environment. It just can't be done."

Al gave a loose-jointed shrug. "Yeah. I guess cloning won't work. That Brando clone didn't pan out either."

Frank shuddered. "It just huddles in a corner and picks its nose."

"But where can we get writers with creative talent?" Al demanded.

There was no answer.

Year: 2012 AD

**NOBEL PRIZE FOR SCIENCE AND/OR MEDICINE:
JEFFERSON MUHAMMED X, FOR DEVELOPING
TECHNIQUE OF RECREATING FOSSILIZED
DNA**

**OSCAR/EMMY/TONY AWARD: BEST ENTER-
TAINMENT SERIES, "THE PLUTONIUM HOUR"
PULITZER PRIZE FOR FICTION OR DRAMA: NO
AWARD**

It was at a party aboard the ITT-MGM orbital station that Al and Frank met the real estate man. The party was floating along in the station's zero-gravity section, where the women had to wear pants but didn't need bras. A thousand or so guests drifted around in three dimensions, sucking drinks from plastic globes, making conversation over the piped-in music, standing in mid-air up, down, or sideways as they pleased.

The real estate man was a small, owlish-looking youngster of thirty, thirty-five. "Actually, my field is astrophysics," he told Al and Frank. Both of them looked quite distinguished in iridescent gold formal suits and stylishly graying temples. Yet Al still managed to appear slightly mussed while Frank's suit had creases even on the sleeves.

"Astrophysics, eh?" Al said, with a happy-go-lucky grin. "Gee, 'way back in college I got my PhD in molecular genetics."

"And mine in social psychology," Frank added. "But there weren't any jobs for scientists then."

"That's how we became TV producers," Al said.

"There still aren't any jobs for scientists," said the astrophysicist-real estate man. "And I know all about the two of you. I looked you up in the 'IRS Who's Who.' That's why I inveigled my way into this party. I just *had* to meet you both."

Frank shot Al a worried glance.

"You know the Heinlein Drive has opened the stars to humankind," asked the astro-realtor rhetorically. "This means whole new worlds are available to colonize. It's the biggest opportunity since the Louisiana Purchase. Dozens of new Earthlike planets, unoccupied, uninhabited, pristine! Ours for the taking!"

"For a few billion dollars apiece," Frank said.

"That's small potatoes for a whole world!"

Al shook his head, a motion that made his whole weightless body start swaying. "Look fella . . . we're TV producers, not land barons. Our big problem is finding creative writers."

The little man clung to Al tenaciously. "But you'd have a whole new *world* out there! A fresh, clean, unspoiled new world!"

"Wait a minute," Frank said. "Psychologically . . . maybe a new world is what we need to develop new writers."

"Sure," the astro-realtor agreed.

A gleam lit Al's eye. "The hell with new writers. How about recreating old writers?"

"Like Schulberg?"

"Like Shakespeare."

Year: 2037AD

**NOBEL PRIZE FOR SCI-MED: COBBER
McSWAYNE, FOR DETERMINING OPTIMAL**

TERMINATION TIME FOR GERIATRICS PATIENTS
OSCAR / EMMY / TONY / HUGO / EDGAR / ET AL AWARD: THE CALIFORNIA EARTHQUAKE
PULITZER PRIZE FOR WRITING: KRISSEY JONES, "GRANDSON OF CAPTAIN KANGAROO"

Lubbock & Troy was housed in its own satellite now. The ten-kilometer-long structure included their offices, living quarters, production studios, and the official Hollywood Hall of Fame exhibit hall. Tourists paid for the upkeep, which was a good thing because hardly anyone except children watched new dramatic shows.

"Everything's reruns," Frank complained as he floated weightlessly in their foamwalled office. He was nearly sixty years old, but still looked trim and distinguished. Purified air and careful diet helped a lot.

Al looked a bit older, a bit puffier. His heart had started getting cranky, and the zero-gravity they lived in was a necessary precaution for his health.

"There aren't any new ideas," Al said from up near the office's padded ceiling. "The whole human race's creative talents have run dry." His voice had gotten rather brittle with age. Snappish.

"I know I can't think of anything new anymore," Frank said. He began to drift off his desk chair, pushed himself down and fastened the lap belt.

"Don't worry, ol' buddy. We'll be hearing from New Stratford one of these days."

Frank looked up at his partner. "We'd better. The project is costing us every cent we have."

"I know," Al answered. "But the Shakespeare World exhibit is pulling in money, isn't it? The

new hotels, the entertainment complex . . .”

“They’re all terribly expensive. They’re draining our capital. Besides, that boy in New Stratford is a very expensive proposition. All those actors and everything . . .”

“Willie?” Al’s youthful grin broke through his aging face. “He’ll be okay. Don’t worry about him. I supervised that DNA reconstruction myself. Finally got a chance to use my ol’ college education.”

Frank nodded thoughtfully.

“That DNA’s perfect,” Al went on, “right down to the last hydrogen atom.” He pushed off the ceiling with one hand and sailed slowly down toward Frank, at the desk. “We’ve got an exact copy of William Shakespeare—at least, genetically speaking.”

“That doesn’t guarantee he’ll write Shakespeare-level plays,” Frank said. “Not unless his environment is a faithful reproduction of the original Shakespeare’s. It takes an exact reproduction of both genetics and environment to make an exact duplicate of the original.”

“So?” Al said, a trifle impatiently. “You had a free hand. A whole damned planet to play with. Zillions of dollars. And ten years’ time to set things up.”

“Yes, but we knew so little about Shakespeare’s boyhood when we started. The research we had to do!”

Al chuckled to himself. It sounded like a wheezing cackle. “Remember the look on the lawyers’ faces when we told ‘em we had to sign the actors to lifetime contracts?”

Frank smiled back at his partner. “And the construction crews, when they found out that their

foremen would be archeologists and historians?"

Al perched lightly on the desk and worked at catching his breath. Finally he said, more seriously, "I wish the kid would hurry up with his new plays, though."

"He's only fifteen," Frank said. "He won't be writing anything for another ten years. You know that. He's got to be apprenticed, and then go to London to get a job with . . ."

"Yeah, yeah." Al waved a bony hand at his partner.

Frank muttered, "I just hope our finances will hold out for another ten years."

"What? Sure they will?"

Frank shrugged. "I hope so. This project is costing us every dollar we take from the tourists on Shakespeare's World, and more. And our income from reruns is dropping out of sight."



"We've got to hang on," Al said. "This is bigger than anything we've ever done, ol' buddy. It's the biggest thing to hit the industry since . . . since 1616. New plays. New originals, written by Shakespeare. Shakespeare! All that talent and creativity working for us!"

"New dramatic scripts." Frank's eyes glowed. "Fresh ideas. Creativity reborn."

"By William Shakespeare," Al repeated.

Year: 2059 AD

NOBEL PRIZE FOR THINKING: MARK IX OF TAU CETI COMPUTER COMPLEX, FOR CORRELATION OF HUMAN CREATIVITY INDEX WITH LIVING SPACE

ALL-INCLUSIVE SHOWBIZ AWARD: THE EVENING NEWS

PULITZER PRIZE FOR REWRITING: THE EVENING NEWS

Neither Al nor Frank ever left their floater chairs anymore, except for sleeping. All day, every day, the chairs buoyed them, fed them intravenously, monitored their aging bodies, pumped their blood, worked their lungs, reminded them of memories that were fading from their minds.

Thanks to modern cosmetic surgery their faces still looked reasonably handsome and taut. But underneath their colorful robes they were more machinery than functional human bodies.

Al floated gently by the big observation port in their old office, staring wistfully out at the stars. He heard the door sigh open, and turned his chair slowly around.

There was no more furniture in the office. Even

the awards they had earned through the years had been pawned to the Hall of Fame, and when their creditors took over the Hall, the awards went with everything else.

Frank glided across the empty room in his chair. His face was drawn and pale.

"They're still not satisfied?" Al asked testily.

"Thirty-seven grandchildren, between us," Frank said. "I haven't even tried to count the great-grandchildren. They all want a slice of the pie. Fifty-eight lawyers, seventeen ex-wives . . . and the insurance companies! They're the worst of the lot."

"Don't worry, ol' buddy. They can't take anything more from us. We're bankrupt."

"But they still . . ." Frank's voice trailed off. He looked away from his old friend.

"What? They still want more? What else is there? You haven't told them about Willie, have you?"

Frank's spine stiffened. "Of course not. They took Shakespeare World, but none of them know about Will himself, and his personal contract with us."

"Personal exclusive contract."

Frank nodded, but said, "It's not worth anything, anyway. Not until he gets some scripts to us."

"That ought to be soon," Al said, forcing his old optimistic grin. "The ship is on its way here, and the courier aboard said he's got ten plays in his portfolio. Ten plays!"

"Yes. But in the meantime . . ."

"What?"

"It's the insurance companies," Frank

explained. "They claim we've both exceeded McSwayne's Limit and we ought to be terminated."

"Pull our plugs? They can't force . . ."

"They can, Al. I checked. It's legal. We've got a month to settle our debts or they turn off our chairs and . . . we die."

"A month?" Al laughed. "Hell, Shakespeare's plays will be here in a month. Then we'll show 'em!"

"If . . ." Frank hesitated uncertainly. "If the project has been a success."

"A success? Of course it's a success! He's writing plays like mad. Come on, ol' buddy. With your reproduction of his environment and my recreation of his genes, how could he be anybody else except William goddam' Shakespeare? We've got it made, just as soon as that ship docks here."

The ship arrived exactly twenty-two days later. Frank and Al were locked in a long acrimonious argument with an insurance company's computer-lawyer over the legal validity of a court-ordered termination notice, when their last remaining servo-robot brought them a thick portfolio of manuscripts.

"Buzz off, tin can!" Al chortled happily and flicked the communicator switch off before the computer could object.

With trembling hands, Frank opened the portfolio. Ten neatly bound manuscripts floated out weightlessly. Al grabbed one and opened it. Frank took another one.

"Henry VI, Part One."

"Titus Andronicus!"

"The Two Gentlemen of Verona . . . ?"



Madly they thumbed through the scripts, chasing them all across the weightless room as they bobbed and floated through the purified air. After fifteen frantic minutes they looked up at each other, tears streaming down their cheeks.

"The stupid sonofabitch wrote the same god-damned plays all over again!" Al bawled.

"We reproduced him exactly," Frank whispered, aghast. "Heredity, environment . . . exactly."

Al pounded the communicator button on his chair's armrest.

"What . . . what are you doing?" Frank asked.

"Get me the insurance company's medics," Al yelled furiously. "Tell 'em to come on up here and pull me goddam' plug!"

"Me too!" Frank shouted with unaccustomed vehemence. "And tell them not to make any clones of us, either!"

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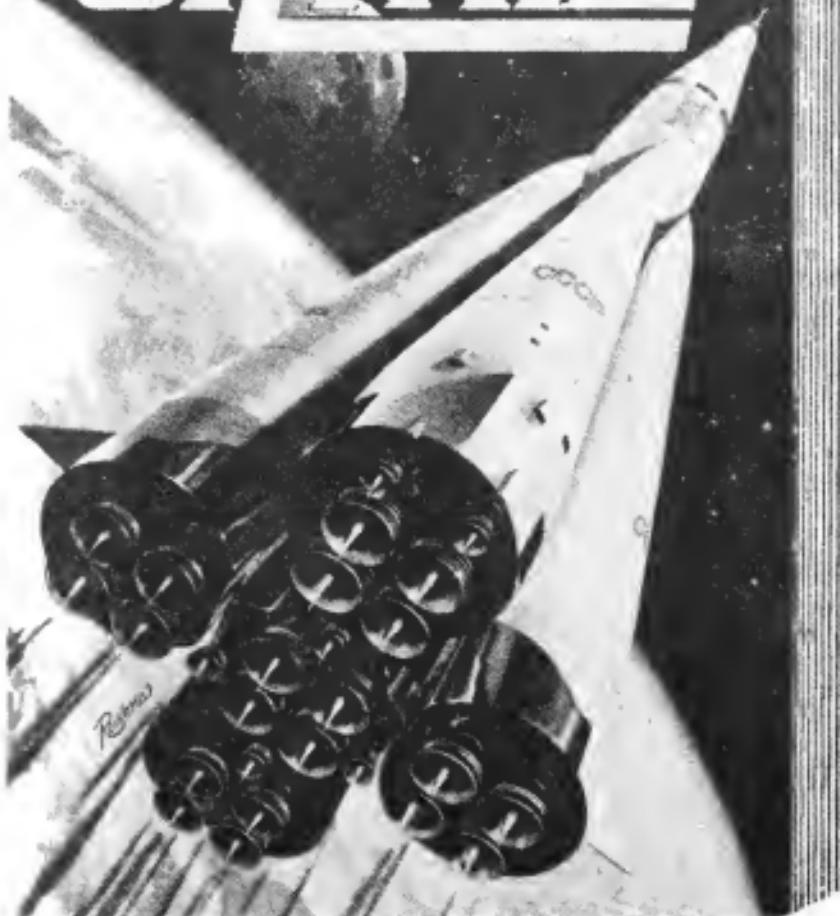
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SPIDER VS. THE HAX OF SOL III

by Spider Robinson

Still I Persist In Wondering, Edgar Pangborn, Dell,
Inherit The Stars, James P. Hogan, Del Rey, 216 pp.,
\$1.50

Casey Agonistes, Richard McKenna, Ace, 212 pp.,
\$1.50

SF & Fantasy Pseudonyms, Barry McGhan, Misfit
Press, 70 pp., \$1.50 or so

The Third Industrial Revolution, G. Harry Stine,
Ace, \$1.95

Colony, Ben Bova, Pocket, 470 pp., \$1.95

Godsfire, Cynthia Felice, Pocket, 264 pp., \$1.75

The Lost Traveller, Steve Wilson, Ace, 245 pp., \$1.95

My best guess is that you feel, as a reader of science fiction, almost entirely powerless to affect it, for good or ill.

If so, you're dead wrong.

This "bookazine" format is aimed precisely at the kind of science fiction reader I used to be, the kind I was right up until, about five years ago, I sold my first story. Does this sound at all like you? I discovered sf in the public library, at a very early age (five), and when I had exhausted the library I turned to the paperback racks. I was peripherally

aware that there were *magazines* publishing the stuff, but very seldom bought one. I probably knew that there were other people who liked sf as much as I did, but never met any. I probably had heard that fandom existed, but I never was a joiner.

And as I searched the sf shelves of the local bookstores, gambling my money and losing three times out of five in the best of times (which God knows these are not), cursing Sturgeon's Law and re-proving it over and over ("90% of everything is shit"), being burned even by authors I liked, the very last thing I suspected was that I could have any conceivable effect on what did or didn't get published in science fiction.

I couldn't even seem to keep track of it. I was constantly finding out that a favorite author's anxiously awaited next book had been in print for over a year without ever appearing in my local bookstore. I didn't know that most publishers will be happy to send you monthly or quarterly press releases for the asking (the PR people love to look active), or that science fiction's monthly news magazine, *Locus*, lists every sf and fantasy title published—as well as year-end statistics, people news, industry news and other innaressing stuff (\$9 a year or \$13.50 for first-class mail, payable to LOCUS PUBLICATIONS, PO Box 3938, San Francisco, CA 94119).

Nor did I know that there were many mail-order houses which would happily sell me new or old sf and fantasy titles that my local bookseller was too obtuse or too limited to stock—and I'll cover as many of them as I can assemble in a future column (Mail-order people please note: send me your catalogs, % *Destinies*).

But most important of all, never did I dream that I had the slightest say in what did or didn't get published. Except, of course, by subsidizing authors with the purchase of their books, but that wasn't much help—I *often* accidentally subsidized Hax and incompetents by purchasing their very bad books.

Does this sound like you? Do you believe that sf comes more or less like the weather, that you're doing damned well if you can *predict* it, much less control it? Have you fallen prey to the 20th Century's fondest myth, that the individual is powerless, and do you numbly accept the heaps of bilge you are served, cursing under or over your breath according to your custom?

If so, you deserve (as I did when I was in that belief system) pretty much the kind of sf you get.

Because sf is unique. Don't turn off, this isn't hype, it's literal truth: of all the arts practiced on this continent, moves, TV plays, music, dance, painting, poetry, sculpture, *what* have you, when it comes time to hand out the awards for excellence, the credentials that artists use to keep themselves alive and working, **ONLY IN SCIENCE FICTION** are *you*, the customer, given a vote*

Didn't know you had one?

Know then that every year the most important and prestigious awards in sf, the Hugo Awards, are bestowed by vote of anyone in the world who chooses to bother. This has been as few as a

*Okay, I've thought of 2 exceptions: the back-country fiddle championships here in Nova Scotia, and baseball's All Star Game, assuming you consider baseball an art. You're not going to spoil such a lovely paragraph for two little exceptions, are you?

couple hundred; I don't believe it has ever been as many as a thousand.

Do publishers pay attention? Do they love a chance to print a book with "Hugo-Award-Winner" on the cover? Do ursine mammals defecate in arboreal regions? Examples: Joe Haldeman's first novel, *The Forever War*, wins the Hugo for Best Novel; paperback rights for his second book set an industry record; Joe now eats regular. My own "By Any Other Name" wins the Best Novella Hugo (in a tie with James Tiptree, Jr.); the asking price of my next novel triples; I currently eat regular.

The Hugos *matter*, people. Of all the thousands of crazed gonzos who will send manuscripts to sf publishers this year, approximately five hundred of them will get letters of acceptance, followed by a contract, followed in due course plus six weeks by a *check* for life-and-work-sustaining dollars. Many of these writers will not have Hugos—for if we apply Sturgeon's Law to that five hundred books, there'll be about fifty decent new ones a year. There's only one Best Novel a year (plus novella, novelette, short story, anthology, artist, editor, best new writer, lifetime contribution to fantasy, and fan Hugos which don't concern us here).

But it's a safe guess that every Hugo-winner who writes a book this year will probably sell it. Likely he'll get his price, too, or she hers. Multiple Hugo winners are even more favored (at this writing my wife Jeanne and I are up for a Hugo for our novella "Stardance," and don't I wish I knew now what I'll know when you're reading this). If you vote a writer a Hugo, his or her books not only sell, but get

better distributed to you, with more fanfare, less copyediting, better covers and no goddam cigarette ads in the middle.

Furthermore, about another five hundred existing titles will be *reprinted* this year, and many of them will be Hugo-winners or by Hugo-winners.

To influence the course of modern science fiction (a lot more statistical influence than your vote probably wields on local zoning laws) costs you between five and ten bucks and an hour of your life. Didn't you waste a lot more than that on bad sf this year?

By the time you read this, the next upcoming World SF Convention will be SEACON '79, to be held in Brighton, England over Labor Day Weekend. YOU NEED NOT ATTEND THE CONVENTION TO VOTE. Worldcons always offer "supporting memberships" at reduced rates. The rates go up as the con approaches, to discourage tardiness: if you're reading this in 1978, you can still get a supporting mem for \$7.50 (US or Canadian, apparently) or £ 4.50 Sterling; if not, it's probably gone ten bucks by now—but the *next* year's will be going for maybe a fin. A supporting membership in Seacon gives you the Hugo franchise for works of sf and fantasy that were first published in the calendar year 1978—that's nominating and final balloting—plus three or four preconvention reports full of fan and pro and con history, gossip, convention news, etc. that might just convince you to convert your membership to "attending" by the time Labor Day Weekend rolls around.

YOU DO NOT NEED TO BE EVEN VAGUELY FAMILIAR WITH ALL THE SF PUBLISHED THAT

YEAR TO VOTE INTELLIGENTLY. If one book all year knocked you out, vote for it. If two, list 'em in order of preference. If none, vote No Award, and use a felt-tip marker. You have no responsibility to audit the field, with some sort of mythical objective standards: you need only report on what you enjoyed, in order of enjoyment. It'll all come out in the wash. If all you read are (let us say) Ace Books, fine, vote accordingly. Ace will become known as a house that distributes and sells books well enough to make Hugo lists, and good writers will come there.

This lead has gotten a bit out of hand, I'll have to pack the actual books in like modular furniture, but tell me: isn't the above information more vital than any single book review could be in helping you to combat the Hax of Sol III?

Not unless I remember to add that those I've convinced can obtain their supporting memberships by writing to:

East Coast USA: Tony Lewis, PO Box 429, Natick MA 01760

West Coast USA: Fred Patten, 11863 W. Jefferson Blvd. # 1, Culver City CA 90230

Canada: John Millard, 86 Broadway Ave. 18, Toronto, Ontario M4P 1T4

British Guest of Honor will be Brian Aldiss, American Guest of Honor will be Fritz Leiber. By the next issue of *Destinies*, the location of the next Worldcon will be known, and I'll keep you posted. Either Boston or—(It's Boston. Ed.).

I guess I could fill up the rest of this column talking about *Still I Persist In Wondering*—and I want to! I am personally involved with it, and it is

personally important to me that you read it, that *everyone* read it. Full disclosure here: I was instrumental in getting it published, I wrote a lengthy foreward for it, I have no financial interest whatsoever in its success or failure, and for more than a year now I have talked myself hoarse about it to anyone who'd listen.

So I'll condense it as much as possible here.

Edgar Pangborn was a writer as good as Mark Twain who chose to do most of his work in science fiction. He wrote a novel called *Davy* that made my eyes water and my cheeks hurt; some of its characters still wake me up at four in the morning. He said once that love is not an event or a condition but a country we are privileged to visit. Reading his work has helped me find the courage to be alive. I love him with all my heart, and he died two years ago, before I ever met him or exchanged a word with him.

In his later years he wrote a great many stories set at various points in the hypothetical (dear God, keep it hypothetical) future world of *Davy*. That is, they are located geographically within a region previously known, in substantially different form, as Upper New York State; and temporally within the first few centuries subsequent to the utter ruin of technological civilization in the Six Minutes' War. The novels *The Company of Glory* and *The Judgement of Eve* also fall within this scheme. There is an internally consistent (and quite unobtrusive) "future history," and there are no running characters or congruent stories that I'm aware of.

Still I Persist In Wondering is a selection, by Edgar, of the very best of these shorter works. I call it the finest collection of sf stories—of any kind of

stories—that will be offered to you this year; if you give it as much as half your attention it will chop you up into dogmeat. You will give copies to special friends, and to people who want to know what you see in that sigh-fie stuff, and you will probably wear out two or three paperbacks yourself over the next forty years or so.

Trust me on this. Buy a copy. If this by you is not superb stuff, then you have found out, at minimal effort and expense, that you and I are incompossible, and you can evaluate or ignore future columns accordingly. I do not say this lightly.

I missed James P. Hogan's *Inherit The Stars* when it first appeared in 1977, but I quite enjoyed his *Genesis Machine* (also a Del Ray paperback), so when the second edition of *Stars* came out I gave it a try (a bit puzzled by the back cover's boldface announcement: "FIRST TIME IN PRINT!" Upon what edition is a book deemed to be in print for the *second* time?).

The whole book is a gigantic scientific puzzle, in which the world scientific establishment—and you, the reader—are given an increasing number of startling and apparently contradictory data, then challenged to reconcile them. Perfunctory efforts are made to flesh out the puzzle with a character or two here and there, but come to nothing. That's not the problem. The background world, in which "The ideological and racial tensions inherited from the twentieth century were

. . . swept away by the tide of universal affluence and falling birth rates that came with the spread of high-technology living," so that "the defense

budgets of the superpowers were progressively reduced year by year," until "By universal assent, world demilitarization became fact," is certainly my own future-of-choice, but it is not one I find especially plausible when simply stated that baldly. It would be worth several books in itself—but here it is plainly intended only as the simplest possible canvas on which to paint Hogan's puzzle. No scientist on the planet has anything more pressing to think about (There are no woman scientists. Apparently Women's Lib went the way of the territorial imperative). And *that's* not the problem either.

Because it's such a lovely puzzle that you overlook these things.

Let me just give you the teaser, as much as the back-cover blurb gives away: A corpse is found on the Moon. Unquestionably human, clad in a red spacesuit, mummified, not a mark on him. He and his red spacesuit are 50,000 years old.

Eeen-ta-resting, no? Could a space-going technology have lived on this planet (and off it) as recently as 50,000 years ago without leaving a single trace? (and Von Danikenian nonsense aside, there is no hard or even medium squishy evidence for the proposition.) Or could all our theories of evolution on Earth be haywire? Parallel evolution? *Where?* To this are added successive discoveries and mysteries, including some honest-to-God aliens found out Ganymede way, just as stone dead, and things get brain-teasing. Hogan presents with maximum versimilitude the picture of a world scientific community pounded by successive paradoxes, struggling for a theory that explains everything, and he kept me going to

over 200 pages of purely intellectual problem, not a broken heart or a threatened hangnail in sight. Hogan is oddly conservative in one area: not once does any scientist entertain for a second the possibility of time travel—to me an irresistible hypothesis. These are reputable men of science, I guess, not irresponsible dreamers. That's not the problem either.

So why *did* I fling the book across the room when I was done with it?

Two reasons, and the first of them involves committing a spoiler of sorts.

SPOILER WARNING! IF YOU DON'T WANT TO KNOW (SOME OF) THE SURPRISE ENDING, SKIP TO THE NEXT REVIEW!

Look, what value the book has is that it builds so beautifully to the momentous moment (as it were) when the puzzle is solved with one master stroke of reasoning—reminding one of the magnificent showdown between Chad Mulligan and Shalmanezer in Brunner's *Stand On Zanzibar*. And when Hogan—pardon me, Hogan's protagonist, I forgot—revealed the Secret Answer, I didn't believe it for a second. Giving away as little as possible, the Secret Answer rests irrevocably upon the following postulate, which is never seriously challenged by the great brains once they grasp it: That the Earth had no Moon until 50,000 years ago; that what we call Luna was until that time a moon of "Minerva," the planet that exploded to form the asteroid belt; that the explosion punted the moon this way (still a near-perfect sphere), it chanced to stumble into a stable orbit, and millions of years of Terran evolution came up against the tidal cycle for the first time a mere 50,000 years back. This

seems to me so preposterous that even Isaac Asimov's imprimatur quote on the cover doesn't soothe me. If it *isn't* preposterous, if there's something I don't know that explains how the entire ecology of this world could center around and depend on a phenomenon only 50,000 years old, then Hogan should have told it me. I liked my time-travel idea better; Occam's Razor.

The second problem is even more infuriating: of all the wonderfully tantalizing mysteries Hogan creates, only half of them (well, possibly as many as two thirds) get explained in this book, even that illogically.

No, don't tell me. I know there's a sequel, *The Gentle Giants of Ganymede*, on the stands right now. That's precisely what gets up my nose.

Do you know the Marx Brothers' movie (*Day At The Races?*) with the "Getta You Tuttsi-Fruttsi Ice-a Cream" scene? Chico is the ice cream man at the racetrack; on the side he hawks tout books, a guaranteed winner every race, only a dollar. Against his better judgement, Groucho buys the book—only to find out that it is worthless without its companion volume. *Knowing* what's coming, he anted up another buck—and finds that both books are worthless without the code key, which costs another dollar. "You, uh, wouldn't happen to have one on you?" By the end of the scene Chico has cleaned him out, Groucho is staggering under a dozen volumes, and the track has closed for the day.

I have no objection to dualogies, trilogies, tetralogies or googologies, as long as they are plainly so labeled at the point of purchase. Every time I get suckered into buying an unlabeled one, I fling

the book across the room, shout, "Getta you tuttsi-fruttsi science-a fiction," and resolve to sit on my wallet (I got my review copy free, but the principle applies). This is not particularly fair to Hogan, who as a new writer probably had zero packaging control, but then he could quite easily have mitigated my wrath with a satisfying climax, and gave me instead a series of absurdities. (I haven't told you the *half* of it, honest.) So I refuse to read the second book—even though dammit I confess I'm curious as hell about Koriel and them giant aliens.

I mean, how do I know I'd find out *this* time? Or believe it when I do?

I'd like to speak for a moment to the genuine fanatics among you.

I don't necessarily mean Fans. Years before I suspected the existence of organized fandom, I yearned to own every word Cyril Kornbluth ever wrote; likewise Heinlein, Sturgeon, and a few others. When I love an author I desire to possess him or her totally, good parts and bad. That means pseudonymous jobs too.

A pseudonym does not necessarily imply a hack job. Witness "James Tiptree, Jr." Cyril Kornbluth used different names for different types of stories, on the theory that you frustrate your reader's expectations at your peril. Many magazines have a damfool rule against an author's name appearing twice in the same issue. The Foreward of *Science Fiction and Fantasy Pseudonyms* lists twelve reasonably honorable and remotely plausible explanations right off the bat (only a baseball player or a henpecked husband can write off the bat, ac-

cording to the IRS.). This alone makes it worth a buck and a half for ingenuity.

And since I am the kind of fanatic who haunts second-hand bookstores with lists of names and titles (though not, I hasten to add, with anything like the dedication and expertise of the people I seem to meet here, let alone the professionals who run them), this turns out to be one of the most fascinating and useful reference works I've purchased in quite a while.

Let me try a couple on you. Answer will be found at the end of the column, printed backwards or sideways or some damn thing (surprise me, Jim).

- 1) What do Simon York, Caleb Saunders and John Riverside have in common?
- 2) How about Price Curtis, Wallace Edmondson, Clyde Mitchell, Nalrah Nosille, Bert Parker, Jay Solo and Derry Tiger?
- 3) Why wouldn't you want Alexander Blade in your bedroom?
- 4) What did Herman W. Mudgett and H. H. Holmes have in common with Anthony Boucher?
- 5) Why is L. C. B. Yin, whom I have never met, unquestionably a saintly man?

None of these actually taken from the book, you understand: it's a simple alphabetically arranged listing, real names in boldface, pen names in normal type, collaborations noted. But it hints at a thousand stories . . .

There are of course minor errors (the sun came up this morning). "Jordan Park," for instance, was *not* used by Cyril Kornbluth only for collaborations with Fred Pohl (the last novel Cyril ever pub-

lished was a mainstream gem called *The Man of Cold Rages* under the "Park" name.). But a lot of the classic errors are avoided: Compiler Barry McGhan has the straight goods, for instance, on the Library of Congress's classic blunder (they list Theodore Sturgeon as a pen name of E. Hunter Waldo;" in fact, it's the other way around. The mistake is replicated in libraries throughout the world, and appears permanent.). And he has all fifteen of Cyril's pen names, with the collaboration details straight as far as I know. McGhan's bibliography lists 42 sources, and he was sensible and thorough enough to employ private communications and oral history. The edition I have is revised and updated to 1976.

Highly recommended to both the serious collector and to the casual fanatic who thinks he has a complete set of Poul Anderson but lacks anything by "Winston P. Sanders" or Michael Karageorge," this pamphlet is bound to be a standard reference work for years. I got my copy at a Worldcon—Rusty Hevelin, sf's premier huckster, turned me on to it—but you can order yours direct from Misfit Press publisher Howard DeVore, 4705 Weddel St., Dearborn Michigan.

Next a book packed to the margins with speculative thought, based on up-to-the-minute scientific information, optimistic in its assumptions and as plausible as can be. Its only problems are a total absence of characters, dialogue and action.

All right, I'll stop. *The Third Industrial Revolution* is not supposed to have such things: it's not a novel. It is one of the most far-sighted and truly

seminal works of speculative fact you're likely to find (yes there is such a thing as speculative fact).

The industrialization of space is not a startling idea any more; I read that the West German firm OTRAG is currently offering to put payload into orbit for half what NASA charges. But it was a startling idea when G. Harry Stine first began publishing the essays and articles that culminated in this book. I don't know who was the first to conceive of industry in space; it certainly wasn't Stine. But he is the first qualified engineer to examine the subject at book length, and his book is still the best available on the subject, nearly four years after its hardcover publication. (I'm working from the hardcover—Baen tells me the Ace edition will be extensively updated by the author.)

Most people intelligent enough to read sf have by now heard of at least a few of the more obvious uses of an environment which features zero gravity, near-perfect vacuum (*damn* near perfect in the wake of a spacecraft), effectively infinite free power, tin-foil construction, a temperature gradient from near-zilch to near-solar and virtually unlimited resources. The ones I hear talked about at parties are perfect bearings (zero-gee-perfect sphere), perfect lenses, and some mumble about supercrystals. I haven't got room here to begin a sketch of an outline of the most intriguing of the *real* possibilities that Stine discusses and cost-analyzes; suffice it to say that the above ambitions are as extravagant as Wilbur and Orville surveying their new creation and wondering if they couldn't someday charge people as much as a dime apiece for rides.

I also hear Zero-Growth Economy talked about

a lot at parties. The *desirability* of this policy was eloquently summed up by Gerard O'Neill in the latest issue of *CoEvolutionary Quarterly* (of which more in another column): "If the United States is content to see its own position in the world shrink to a level appropriate to its population (less than 4% of the world total by the year 2,000), and is content to redistribute its wealth internally, rather than earning new wealth, then it is free to adopt zero-economic-growth policies. For most of the world, though, rapid economic growth is a vital, urgent need, if massive starvation is to be averted." And now, thanks to G. Harry Stine, the *necessity* of Zero Growth claimed by the Club of Rome and others is shown to be equally nonexistent.

(Thank God! I've tried living without technology—because of curiosity and extreme poverty—and now I have a great admiration for electric power, running water, chain-saws and good typewriters.)

Stine is a distinguished aerospace engineer who *knows* what's available off-the-shelf hardware and what isn't. His writing style is a bit labored, but what he's laboring *toward* is a comprehensibility and impact, and he succeeds wonderfully if occasionally at the expense of literary grace.

This book will be the bible of space industrialization until such time as someone writes a better one from fist-hand experience (maybe Stine), and contains enough hard information, honest figures and *conservatively* optimistic projections to help you publicly refute all those suicidal lemmings who want everybody at the party to be as depressed as they are.

Friends, there is an enormous rich cloud on the

horizon; very shortly (if we are lucky; if we keep our heads) it is going to start raining soup. Heed the words of weatherman Stine: get yourself a bucket.

Yes, the Richard McKenna of *Casey Agonistes* is the same McKenna that wrote *The Sand Pebbles*. According to Damon Knight's introduction to *Casey*, McKenna maintained that *Sand Pebbles* was a science fiction novel, the science being cultural anthropology. He must have been a beautiful man and I wish I had known him.

The title story of this collection is one of the acknowledged classics of sf, has been reprinted several times since its original appearance in *The Magazine of Fantasy & Science Fiction* in 1958, and has never been forgotten by anyone who read it—it's good to see it made available to a new generation of readers. "The Secret Place," also included, was voted the Nebula Award for Best Short Story by the Science Fiction Writers of America (don't know what year, I'm away from my library). "Mine Own Ways" is a story I first read when I was thirteen ("The Golden Age of SF") that's been stuck in my subconscious ever since; rediscovering it was a joy. The first three pages are so unbearably compressed as to be nearly unreadable; from there on it is profoundly unsettling study of what it means to be human. A few of these stories show their age, but so what? "Casey" itself is timeless, anyway. Pain and joy are timeless, and fear and courage, and these are the things McKenna knew intimately and wrote. And my, that's a fine cover painting—where can I find more by this David Schleinkofer?

I'm late in reviewing this book—it's already

made the rounds of the stores, and the only way you're going to get it is by mail-order or by writing to Ace Books. I'd say it's worth the effort.

Similarly, Ben Bova's *Colony* deserves more space than I have left to give it and want to mention it while you can still buy a copy. Quite simply, it does everything that *Inherit The Stars* did wrong: it is a scientifically defensible story, based on informed and plausible extrapolations of present trends (space colonies, terrorists, clones, solar power satellites and rectennas, etc.), peopled with characters who breathe and suffer (male and female), and after 470 exciting and tightly plotted pages, it ends at the goddam end of the book. It is the first entry I've come across in the race to get a Space Colony book out, and it is handily the best so far (sorry, Ben, I couldn't resist).

I don't like it as much as I liked *Millenium* — but then there are damn few books by anybody that I like as much as *Millenium*. And there is not an overwhelming shortage of good readable sf adventures that run toward 500 pages for a buck ninety-five. *Colony* just seems a hair too well designed to be a bestseller in the Good Light Read division, and I like Ben's writing better when it just boils up out of him.

But you could do much worse.

Two extraordinary first novels to leave you with.

I'm cat-people myself (I've been employed by as many as 13 cats at one time), so I'm a sucker for a book whose viewpoint character is a very well thought out feline biped ("intelligent feline" would be redundant). But that isn't ten percent of what new writer Cynthia Felice has going for her in

The background world, with its great Ring and consequent equatorial Shadowband, is fascinating. The dominant feline race is *precisely* what cats would be like if they stood on their hind legs and spoke English (they use what we would call humans as slaves). The protagonist, Pathfinder Heao, is a rich, real, rounded character—all the characters are alive. The story is a bit uneven in spots, but quite satisfying in the end (though she has left *room* for a sequel, Felice hasn't left a hole the size and shape of one, if you follow me). And the interplay between Heao and her human slave Teon is handled with wit, taste and style. I paid cash for this book on the strength of a short story in *Millenial Women*, the only other writing of Felice's I've seen, and as far as I'm concerned I struck oil.

Steve Wilson's *The Lost Traveller* (that's the way he spells it, and according to my dictionary he's entitled) sort of snuck up on me. The jacket flap of the St. Martin's Press hardcover made it sound like a direct ripoff of Zelazny's *Damnation Alley*, and the author had no track record at all. But I was amused by the audacity with which this fledgling had subtitled his masterpiece "A Motorcycle Grail Quest Epic and Science Fiction Western" (regrettably, this had to be compressed to fit on the paperback cover). So I tried it, and by golly I got seduced.

I wouldn't be surprised to learn that Wilson has never *heard* of Zelazny's book. What he is is a natural storyteller, who knows bikes and bikers and how humans react under stress. He has two things that new writers in this field seldom have: a

grasp of the accepted conventions and metaphors of Post-Holocaust stories, and the ability to write really good slambang action and fight scenes, and make them work in context with the rhythms of the story. I'll be damned if his book isn't a M.G.Q.E. and S.F.W—it's a page-turner, too.

In filling out your Hugo ballot—you're *going* to send in for your Hugo ballot, aren't you?—be sure to remember both Felice and Wilson when you nominate for the John W. Campbell Award For Best New Writer: writers benefit from applause just like any artist. Both need to grow, of course, Felice could learn more about prancing, and I hope Wilson will next try his hand on a story that isn't quite so brutal, violent and tragic—you know, throw in a *non-rape* scene now and then for change of pace.

But for first novels they're awfully good, both of them.

Oh yes, the answers to the Pseudonym Quiz: (Why doesn't anybody ever use a *real* nym? Why don't even organic freaks put real poo on their hair?)

- 1) They are all pen names of Robert A. Heinlein.
- 2) They are all pen names of Cordwainer Bird.
- 3) Blade, the most popular pen name in sf, has been 17 people, some of whom are dead. Notables include Randall Garret, the late Edmond Hamilton and the early Robert Silverberg.
- 4) They were all pen names of William Anthony Parker White.
- 5) Because Leslie Yin, under the pen name Leslie Charteris, created the immortal stories of Simon Templar, the swashbuckling Saint. •

If at first you don't succeed...

SECOND CHANCE



by Orson Scott Card



By the age of seven Batta was thoroughly trapped, though she scarcely recognized it until she was twenty-two. The bars of her cage were so fragile that to most people they would not have existed at all:

A father, crippled in a freak tube accident and pensioned off by the government months before Batta was born.

A mother with a heart of gold and a mind unable to concentrate on one subject for more than three minutes at a time.

And brothers and sisters who, in the chaos and depression of the mindless, will-less home, might have come unstuck from the fabric of adjusted society had not Batta decided (without deciding) that she would be mother and father to her siblings, her parents, and herself.

Many another person would have rebelled at having to come directly after school, with never an opportunity to meet with friends and do the mad things through the endless corridors of Capitol that occupied the time of most adolescents of the middle class. Batta merely returned from school and did homework, fixed dinner, talked to mother (or rather, listened), helped the other children with their problems, and braved the den where father hid from the world, pretending that he had legs, or that the lack of them had not diminished his worth. ("I fathered five damned children, didn't I?" he insisted from time to time.)

But all was not bleak. Batta loved studying, was, in fact, not far from being a genius—and she indulged herself enough to go to college, largely because she got a scholarship and her mother be-

lied in taking advantage of every free thing that came.

And in college there was this one young man.

He was not far from being a genius, too—from the other side. Batta had never known anyone like him (she didn't realize that she had hardly known anyone at all), but a crazy friendship grew up that ranged from gift-wrapped presents of dissected thwands from Basic Zoology to hours of silence together, studying for examinations.

No held hands. No attempted kisses. No fumbling experimentation in the dark.

Batta was unsure of what it was like and whether she would want it (she always imagined her mother making love to a legless man), while she wondered if Abner Doon ever thought of sex at all.

And then college ended, degrees were granted—hers in physics, his in government service—and they stopped seeing each other and the months went by and she was twenty-two and it suddenly occurred to her that she was trapped.

"Where are you going? You're through with college, you don't have to go to class anymore, do you?" her mother asked plaintively.

"I thought I'd take a walk," Batta answered.

"But Batta, your father needs you. You know he's only happy when *you're* here."

Which was true. And Batta spent more and more hours inside the three-room flat until one day, almost a year after graduation, a buzzer.

"Abner," she said, more in surprise than in delight. She had almost forgotten him. Indeed, she had almost forgotten that she had a college education.

"Batta. I haven't seen you. I wanted to."

"Well," she said, turning around for him to see her but knowing she looked terrible even as she did it, "here I am."

"You look like hell."

"And you," she said, "look like a specimen that they forgot to dissect."

They laughed. Old times, old magic. He asked her out. She refused. He asked her to go for a walk. She was too busy. And when her father called her out of the room for the fifth time since he had arrived, he decided the conversation was over and had left the apartment before she returned.

And she felt more trapped than ever.

Days passed, and in every day something different happened as the other children grew older (and married or didn't marry but left home anyway) but looking back Batta felt that the days were all the same, after all, and the illusion of variety was just her mind's own way of keeping itself sane. And at last, when Batta was twenty-seven and a virgin and lonely as hell, all her brothers and sisters were gone and she was alone with her parents.

That was when Abner Doon came again.

He had not been on somec either, she noticed to her surprise as she showed him into the living room (same battered furniture, only older; same color walls, only dirtier; same Batta Heddis, only deader) and he sat, looking her over carefully.

"I thought you'd be on somec by now," she said.

"So did everyone. But there are some things that can't be done while one sleeps the years away. I can't go on somec until I'm ready."

"And when will that be?"

"When I rule the world."

She laughed, thinking it was a joke. "And when they find out I'm Mother's long-lost daughter kidnapped by gypsies and kept by space-pirates, they'll make me empress after her."

"I'm going on somec within the year."

And she didn't laugh. Only looked at him carefully and saw the way worry and work and, perhaps, cruelty had worn certain lines in certain places and given him an expression that made his eyes seem deep and hard to plumb. "You look like you're drowning," she said.

"And you look like you're drowned."

He reached out and took her hand. She was surprised—he had never done that. But the hand was warm, dry, smooth, firm—just as she had thought a man's hand ought to feel (not like father's claw) and she didn't take her hand away.

"I saw how it was when I came before," he said. "I've been waiting till you were free. The last of your loving siblings left a week ago. Your affairs should be in order. Will you marry me now?"

Three hours later, they were halfway across the sector in a modest-seeming apartment (only seeming—computers and furniture came, literally, out of the walls) and she was shaking her head.

"Ab," she said, "I can't. You don't understand."

He looked concerned. "I thought you'd prefer the contract. It's so much safer for everyone. But if you'd rather we kept it informal—"

"You don't understand. Five minutes before you came I was praying for something like that to happen, anything to get me away from there—"

"Then come away."

"But I keep thinking about my parents. My mother, who can't manage her own life, let alone father's, and father, who does his best to rule everyone and only I can keep him under control and happy. They need me."

"At the risk of being thought trite, so do I."

"Not much," she said, waving her hand to indicate the paraphernalia that proved that he was a man of power and wealth.

"This? In fact, Batta, this is all part of a much grander plan. A direct line leading to something rather fine. But I'd rather share it with you."

"You are a romantic idiot like all the other adolescents," she laughed. "Share it with me nonsense. What makes you even think you love me?"

"Because, Batta, every now and then my dream fails to keep me warm."



"Women are rather inexpensive."

"Batta isn't even for sale," he reminded her, and then he reached out and touched her as she had never been touched, and she held him as she had never held anyone. For two hours everything was new, every flutter, every smile.

"No," she whispered as he was about to end her long sexual solitude. "Please no."

"Why," he whispered back, "the hell not?"

"Because if you do, I'll never be able to leave you."

"Excellent," he said, and moved again, but she slid away, slid off the bed, began dressing.

"You have very poor timing," he said. "What's wrong?"

"I can't. I can't leave mother and father."

"What, are they so loving and kind to you?"

"They need me."

"Dammit, Batta, they're grownup people, they can take care of themselves."

"Maybe when I was seven, they could," she said, "But by the time I was twelve they couldn't. I was dependable. I could do it. And so they lost all their pretenses at adulthood, Ab. I couldn't go off and be happy knowing they'd disintegrate, having to watch them."

"Yes you can. Knowing that if you don't you'd disintegrate. I can put you on somec, Batta, right now. I can put you under for five years and when you woke up they'd have learned to take care of themselves and you could go see them and know that everything was all right."

"Do you have that kind of money?"

"When you get enough power in this lovely little empire," Abner Doon answered, "money becomes

unnecessary."

"When I wake up they might be dead."

"Perhaps. And then they'd definitely not need you."

"I'd feel guilty, Ab. It would destroy me."

But Abner Doon was persuasive, and by small stages he got her to lie down on a wheeled table and he put a sleepcap on her head and taped her brain. All her memories, all her personality, all her hopes, all her terrors were recorded and filed in a tape that Abner Doon tossed up and down in his hand.

"When you wake up, I'll play it back into your head, and you won't even notice that you were asleep."

She laughed nervously. "But anything that happens now, the somec wipes out, right?"

"True," Doon answered. "I could ravish you and perform all kinds of obscene acts, and when you woke up you'd still think I was a gentleman."

"I never have thought such a thing," she said.

He smiled. "Now let's get you to sleep."

"What about you?" she asked.

"I told you. I'm a year away. I'll be a year older when I wake you up, and we begin our life together, with or without benefit of contract. Good enough?"

But she began to cry, and she kept crying until it was near hysteria. He held her, rocked her back and forth, tried to find out why she was crying, tried to understand what he had *done*, but she answered, "Nothing. Nothing."

Until finally he brought out the somec bottle (but no one has a private supply of somec! It's the law—) and a needle and reached for her to lay her

on the table. She pulled away, retreated to the other side of the room.

"No."

"Why not!"

"I can't run away from my parents."

"You've got your own life to live!"

"Ab, I can't do it! Don't you see? Love isn't just a matter of liking somebody. I don't like my parents very much. But they trust me, they lean on me, I'm their whole damn foundation, and I can't just walk away and let them fall down."

"Sure you can! Anybody could! It's sick, what they've done to you, and you have a right to your own life."

"Anybody could do it except *me*. I, Batta Heddiss, am a person who does *not* walk away. That's who I am! If you want the kind of person who would, then go look somewhere else!" And she ran from the apartment to the tube station, returned home, closed the door and lay on the sofa and wept until her father called impatiently from the other room and she walked in and lovingly stroked his forehead until he could go to sleep.

When the brothers and sisters were there, Batta could pretend there was variety. Now, there was no pretense. Now, she was the entire focus of their lives and she was being slowly worn down, at first by the constant work and constant pressure (but she grew stronger than ever and soon settled into the routine better than ever until she couldn't conceive of another way) and later simply by the utter loneliness even while she was utterly unable to be alone.

"Batta, I'm doing embroidery, they do it with

real cotton in the rich houses but there's no way we could afford that, of course, on your father's pension, but see what a lovely flower I'm making — or is it a bee? Heaven knows, I've never seen either, but don't you see what a lovely flower it is? Thank you, dear, it's a lovely flower, isn't it? They do it with real cotton in the rich houses, you know, but we could never afford that on your father's pension, could we? So this is a synthetic. It's called embroidery, will you look at the lovely bee I'm making? Isn't it lovely? Thank you, Batta dear, you have such a wonderful way of making me feel just lovely. I'm doing embroidery, you know. Oh, dear, I think your father's calling. I must go to him—oh will you? Thank you. I'll just sit here and embroider, if you don't mind."

And in the bedroom, stolid silence. A groan of pain. The legs starting normally at the hip and then suddenly, abruptly, ending (not two centimeters from the crotch) in a steep cliff of sheets and blankets that fell away and left the bed flat and smooth and unslept-in.

"Do you remember?" he grunts as she turns the pillow and brings him his pills, "do you remember when Darff was three he came in and said, 'Daddy, you should have my bed and I should have yours, because you're as little as I am.' Damnfool kid, and picked him up and gave him a hug and wanted to strangle the little bastard."

"I didn't remember."

"Science has done everything else, but they can't figure out how to heal man when he's lost his hams, lost his legs, lost every damn nerve. But one, thank heaven, but one."

She loathed bathing him. The tube had caught

him slantwise in the mouth of the tubeway. If he'd been turned around it would have ripped out his abdomen and killed him on the spot. As it was, he had lost his buttocks to the bone, his intestines were a mess, he had no bowel control, and his legs were a fragment of bone. "But they left me enough," he so proudly pointed out, "to father children."

And so it went endlessly day after day and Batta refused to remember Abner Doon, refused to admit that she had once had a chance to get away from these people (if only) and live her own life (if only) and be *happy* for a while (if only I hadn't—no, no, can't think that way).

Then mother decided to make a salad while Batta was away shopping and cut her wrist with the knife and apparently forgot that the emergency call button was only a few meters away because she had bled to death before Batta could get home, a look of surprise frozen on her face.

Batta was twenty-nine.

And after a while father began making hints about how a man's sexual drive doesn't diminish with nonuse, but only increases. She ignored him with gritted teeth until he, too, died one night and the doctor said it had only been a matter of time, the accident had messed him up so badly, and in fact if he hadn't had such excellent care he wouldn't have lasted *this* long. You should be proud of yourself, girl.

Age thirty.

She sat in the living room of the apartment that she alone controlled. Her father's pension would continue—the government was kind to victims of chance in the transportation system. She kept

staring at the door and wondering why in the world she had longed to get away. After all, what was there to do outside?

The walls closed in on her. The flat bed in her parents' room looked just as it had when father lay there all day, at least from where his legs would be on down. But when she rolled up blankets to look like legs and stretched them under the sheets on the bed, putting legs where she had never seen legs before, it occurred to her that she had lost her mind.

She packed her few belongings (everything else belonged to them and they were dead) and left the apartment and went to the nearest colony office because she couldn't think of anything better to do with the rest of her disastrous life than to go off to a colony and work until she died.

"Name?" asked the man behind the counter.

"Batta Heddiss."

"This is a wonderful step you've decided to take, Miss Heddiss—single, yes?—because these colonies are the empire's newest way of fighting and winning the war. Only peacefully, you understand. Heddiss, did you say? Come this way, please."

Heddiss, did you say? Why had he looked so surprised? And so excited (or was it alarmed)?

She followed him to a room a corridor away, a plush, convenient room with only the one door. A guard stood outside it, and she thought with terror that something was wrong, that Mother's Little Boys were going to accuse her of something, and she was innocent but how can you ever prove innocence to people already convinced of their own infallibility?

The wait was interminable—two hours—and



she was reduced to a wreck by the time the door opened. Reduced to a wreck, that is, by her own perceptions. To an impartial observer coming in the door she was utterly calm—she had learned to exude calm no matter what the stress years before.

But it was not an impartial observer who walked in the door. It was Abner Doon.

"Hello, Batta," he said.

"My God," she answered, "my dear sweet God, do I have to be punished like this?"

His face went tense somehow, and he looked at her carefully. "What have they done to you, lady?"

"Nothing. Let me out of here."

"I want to talk to you."

"We forgot it years ago! I forgot it! Now don't remind me!"

He stood by the door, and it was obvious that he was horrified and fascinated—horrified because as she spoke so passionately her voice remained flat and calm, her body remained erect, there was no hint that she was in any kind of turmoil; fascinated because the body was still Batta, still the woman he had loved and had been willing to share his dream with not that many years before, and yet she was a complete stranger to him now.

"I've been on somec for several years," he said. "This is my first waking. I had them all warned—a code was to be set off when your name came up for colonization."

"What made you think it would?"

"Your parents had to die sometime. And when they did, I knew you'd have nowhere to go. People with nowhere to go, go to the colonies. It's politer than suicide."

"Leave me alone, please. Can't you have a little

forgiveness for my mistake?"

He looked eager. "Did you call it a mistake? Do you regret it?"

"Yes!" she said, and now her voice raised in pitch, and she actually looked agitated.

"Then, by heaven, let's undo it!"

She looked at him with contempt. "Undo it! It can't be undone! I'm a monster now, Mr. Doon, not a girl anymore, a robot that performs services for revolting people without complaint, not a woman who can respond to anything the way you wanted me to. Nothing can be undone."

And then he reached into his pocket and held out a tape.

"You can go under somec right now and let the drug wipe out all your memories. Then I'll play this back into your mind, and you'll wake up believing that you did not decide to go back to your parents. That you decided to stay with me in the first place. You will be unchanged. The last few years will be erased."

She sat, uncomprehending for a few moments. Then, hoarsely, huskily, she said. "Yes. Yes. Hurry." And he led her to a tape-and-tap where they taped her brain and put her under somec and her mind washed away in the drug.

"Batta," a voice said softly, and Batta awoke, naked and sweating on a table in a strange place. But the face and the voice were not strange.

"Ab," she said.

"It's been five years," he said. "Your parents both passed away. From natural causes. They weren't unhappy. You made the right choice."

She was conscious of being naked, and the eter-

nal virgin in her made her flush with embarrassment. But he touched her (and the memory of the night they first almost made love was still fresh—it had been only a few hours ago—and she was already aroused, already ready) and she was no longer embarrassed.

They went to his apartment, and made love gloriously, and they were blissfully happy until she finally admitted what was gnawing at the back of her mind.

"Ab. Ab, I have dreams about them."

"Who?"

"Mother and father. You've told me it's been years, and I know that. But it still feels like yesterday to me, and I feel terrible for having left them alone."

"You'll get over it."

But she did not get over it. She began to think of them more and more, guilt gnawing at her, tearing at her dreams, stabbing like a knife when she made love with Abner Doon, destroying her as she did all the things that she had wished, since she was a child, she could do.

"Oh, Ab," she wept one night—only six nights since waking—"Ab, I'd do anything, anything to undo this!"

He stopped moving, just froze. "Do you mean that?"

"No, no, Abner, you know I love you. I've loved you ever since we met, all my life, even before I knew you existed I loved you, don't you know that? But I hate myself! I feel like a coward, like a traitor for having left them."

"They were perfectly happy. They never noticed you were gone."

"That's a lie."

"Batta, please forget them."

"I can't. Why couldn't I have done the right thing?"

"And what was that?" He looked afraid. Why is he afraid?

"To stay with them. They only lived a few years. If I'd stayed with them, if I'd helped them through the last few years, then Ab, I could face myself. Even if they were miserable years, I'd feel like a decent person."

"Then feel like a decent person. Because you did stay with them."

And he explained it to her. Everything.

She lay silently on the bed, staring at the ceiling.

"Then this is a fraud, isn't it? Secretly, truly, I'm a miserable bitch of an old maid who rotted away in her parents' house until they had the courtesy to die, a woman without the guts to commit suicide—"

"Absurd—"

"Who was only saved from her fate by a man who contrived to play God."

"Batta, you have the best of both worlds. You *did* stay with your parents. You *did* the right thing. But you can *go* on with your life now without having the memories of what they did to you, without having to become what you became."

"And was I so horrible?"

He thought of lying to her, but decided against it. "Batta, when I saw you in that room in the colonization office, I nearly cried. You looked dead."

She reached over and stroked his cheek, his shoulder. "You saved me from the penalty of my own mistake."

"If you want to look at it that way."

"But there's a contradiction here. Let's be logical. Let's call the woman who decided to stay with her parents Batta A. Batta A actually stayed and went crazy, like you said, and *she* chose to go off to the colonies and keep her madness to herself."

"But it didn't happen that way—"

"No, listen," Batta insisted, quietly, intensely, and he listened. "Batta B, however, decided not to go back to her parents. She stayed with Abner Doon and tried to be happy, but her conscience tore at her and drove her mad."

"But it didn't happen that way—"

"No, Ab, you don't. You don't understand. Understand at all." Her voice cracked. "This woman lying on the bed beside you—this is Batta B. This is the woman who turned away from her parents and didn't fulfill her commitment—"

"Dammit, Batta, listen to reason—"

"I have no memory of helping them. They suddenly—end. I walked out on them—"

"No you didn't!"

"In my own mind I did, Ab, and that's where I have to live! You tell me I helped them but I can't remember it and so it isn't true! That choice—that was the choice that the real Batta made, staying with them. And so the real Batta was shaped by that experience. The real Batta suffered through those years, even if they were awful."

"Batta, they were worse than awful! They destroyed you!"

"But it was *me* they destroyed! *Me!* The Batta who chooses to do what she believes she ought to!"

"What is this, the old-time religion? You have a

chance to be spared the consequences of your own suicidal sense of right and wrong! You have a chance to be *happy*, dammit! What difference does it make which Batta is which? I love you, and you love me, lady, and *that's* the truth, too!"

"But Ab, how can I be anything but what I am?"

"Listen. You agreed. Instantly. You agreed to let me erase those years, to wake you up and have you live with me as if that agony had never happened. It was voluntary!"

She didn't answer. Only asked, "Did they tape me when they put me under somec? Did they record the way I really am?"

"Yes," he said, knowing what was coming.

"Then put me under again and wake me up with that tape. Send me to a colony."

He stared at her. He got up from the bed and stared at her incredulously and laughed. "Do you realize what you're saying? You're saying, please take me out of heaven, God, and send me to hell."

"I know it," she said, and she began trembling.

"You're insane. This is insane, Batta. Do you know what I've risked, what I've gone through to bring you here? I've broken every law concerning the use of somec that there is—"

"You rule the world, don't you?"

Was she sneering?

"I pull all the strings, but if I make a mistake I could fall anytime. I've deliberately made mistakes for you—"

"And so I owe you something. But what about me? Don't I owe me?"

He was exasperated. He hit the wall with his hand. "Of course you do! You owe yourself a life with a man who loves you more than he loves his

life's work! You owe yourself a chance to be pampered, to be coddled, to be cared for—"

"I owe me myself." And she trembled more and more. "Ab. I haven't. I haven't been happy."

Silence.

"Ab, please believe me, because this is the hardest thing I've had to say. Since the moment I woke up, something was wrong. Something was terribly, terribly wrong. I had made the wrong choice. I hadn't gone back to my parents. I have felt *wrong*. Everything has been colored by that. It's *wrong*. *I wouldn't choose to live with you, and so everything about it is wrong!*" She spoke softly, but her voice was intense.

"I would not be here," she said.

"You are here."

"I can't live a lie. I can't live with the contradiction. I must live my own life, bitter or not. Every moment I stay here is pain. It couldn't be worse. Nothing I suffered in my real life could be worse than the agony of living falsely. I must have the memory of having done what I knew was right. Without that memory, I can't keep my sanity. I've been feeling it slip away. Ab—"

And he held her closely, felt her tremble in his arms. "Whatever you want," he whispered. "I didn't know. I thought the somec could—make things over."

"It can't stop me from being who I—"

"Who you are, I know that, I know it now. But Batta, don't you realize—if I use that other tape, you won't remember this, you won't remember these days we had together—"

And she began to sob. And he thought of something else.

"You'll—the last thing you'll remember is my having told you I could erase all the pain. And you saying yes, yes, do it, erase it—and then you'll wake up with those memories and you'll think that I lied."

She shook her head.

"No," he said. "That's what you'll believe. You'll hate me for having promised you happiness and then giving it to you. You won't remember this."

"I can't help it," she said, and they held each other and wept together and comforted each other and made love one last time and then he took her to the tape-and-tap where the past was washed away and a crueler life would be restored to her.

"What, is she a criminal?" asked the attendant as Abner Doon substituted the tapes—for only criminals had their minds wiped and an old tape used to erase all memory of the crime.

"Yes," said Doon, to keep things simple. And so her body was enclosed in the coffin that would satisfy her few needs as her body slowed down to a crawl through the years until he awakened her.

She would awaken on a colony. But one of my choosing, Abner vowed. A kind one, where she might have a chance of making something of her life. And who knows? Maybe hating me will make it all easier for her to bear.

Easier for her. But what about me?

I will not, he decided, spend any more of myself on her. I will close her from my mind. I will—I will forget?

Nonsense.

I will merely devote my life to fulfilling other, older, colder dreams. ●

CULTURAL CONFLICT

by David Drake





A simple misunderstanding...

Platoon Sergeant Horthy stood with his right arm—his only arm—akimbo, surveying the rippling treetops beneath him and wishing they really were the waves of a cool, gray ocean. The trees lapped high up the sides of the basalt knob that had become Firebase Bolo three weeks before when a landing boat dropped them secretly onto it. Now, under a black plastic ceiling that mimicked the basalt to the eye of the Federation spy-satellite, nestled a command car, a rocket howitzer with an air-cushion truck to carry its load of ammunition, and Horthy's three combat cars.

Horthy's cars—except on paper. There Lt. Simmons-Brown was listed as platoon leader.

One of the long-limbed native reptiles suddenly began to gesture and screech up at the sergeant. The beasts occasionally appeared on the treetops, scurrying and bounding like fleas in a dog's fur.

Recently their bursts of rage had become more common—and more irritating. Horthy was a short, wasp-waisted man who wore a spiky goatee and a drum-magazined powergun slung beneath his shoulder. His hand now moved to its grip . . . but shooting meant giving in to frustration and instead Horthy only muttered a curse.

"You say something, Top?" asked a voice behind him. He turned without speaking and saw Jenne and Scratchard, his two gunners, with a lanky howitzer crewman whose name escaped him.

"Nothing that matters," Horthy said.

Scratchard's nickname was Ripper Jack because he carried a long knife in preference to a pistol. He fumbled a little nervously with its hilt as he said, "Look, Top, ah . . . we been talking and Bonmarcher here—" he nodded at the artilleryman—"he says we're not supporting the rest of the Regiment, we're stuck out here in the middle of nowhere to shoot up Federation ships when the war starts."

The sergeant looked sharply at Bonmarcher, then said, "If the war starts. Yeah, that's pretty much true. We're about the only humans on South Continent, but if the government decides it still wants to be independent and the Federation decides it's gotta have Squire's World as a colony—well, Fed supply routes pass through two straits within hog shot of this rock." Simmons-Brown would cop a screaming worm if he heard Horthy tell the men a truth supposed to be secret, but one way or another it wasn't going to matter very long.

"But Lord and *Martyrs*, Top," Bonmarcher burst out, "how long after we start shooting is it gonna be before the Feds figure out where the shells're

coming from? Sure, this cap—" he thumbed toward the plastic supported four meters over the rock by thin pillars—"hides us now. But sure as death, we'll loose one off while the satellite's still over us, or the Feds'll triangulate radar tracks as the shells come over the horizon at them. Then what'll happen?"

"That's what our combat cars are for," Horthy said wearily, knowing that the Federation would send not troops but a salvo of their own shells to deal with the thorn in their side. "We'll worry about that when it happens. Right now—" He broke off. Another of those damned, fluffy reptiles was shrieking like a cheated whore not twenty meters from him.

"Bonmarcher," the sergeant said in sudden inspiration, "you want to go down there and do something about that noisemaker for me?" Two noisemakers, actually—the beast and the artilleryman himself for as long as the hunt kept him out of the way.

"Gee, Top, I'd sure love to get outa this oven, but I heard the Lieutenant order . . ." Bonmarcher began, looking sidelong at the command car fifty meters away in the center of the knob. Its air conditioner whined, cooling Simmons-Brown and the radioman on watch within its closed compartment.

"Look, you just climb down below the leaf cover and don't loose off unless you've really got a target," said Horthy. "I'll handle the Lieutenant."

Beaming with pleasure, Bonmarcher patted his sidearm to make sure it was snapped securely in its holster. "Thanks, Top," he said and began to descend by the cracks and shavings that eternity



had forged even into basalt.

Horthy ignored him, turning instead to the pair of his own men who had waited in silent concern during the exchange. "Look, boys," the one-armed sergeant said quietly, "I won't give you a load of cop about this being a great vacation for us. But you keep your mouths shut and do your jobs, and I'll do my damnedest to get us all out of here in one piece." He looked away from his listeners for a moment, up at the dull iridium vehicles and the stripped or khaki crewman lounging over them. "Any how, neither the Feds or the twats that hired us have any guts. I'll give you even money that one side or the other backs down before anything drops in the pot."

Scratchard, as lean and dark as Horthy, looked at the huge, blond Jenne. There was no belief on either face. Then the rear hatch of the command



car flung open and the communications sergeant stepped out whooping with joy. "They've signed a new treaty!" he shouted. "We're being recalled!"

Horthy grinned, punched each of his gunners lightly in the stomach. "See?" he said. "You listen to Top and he'll bring you home."

All three began to laugh with released tension.

Hilf, Caller of the Moon Sept, followed his step-brother Seida along the wire-thin filaments of the canopy. Their black footpads flashed a rare primary color as they leaped. The world was slate-gray bark and huge pearly leaves sprouting on flexible tendrils, raised to a sky in which the sun was a sizzling platinum bead. Both runners were lightly dusted with the pollen they had shaken from fruiting bodies in their course. The Tree, though an entity, required cross-fertilization among its segments for healthy growth. The even, mottled gray-

tones of Seida's feathery scales blended perfectly with his surroundings and his strength was as smooth as the Tree's. Hilf knew the young male hoped to become Caller himself in a few years, knew also that Seida lacked the necessary empathy with the Tree and the sept to hold the position. Besides, his recklessness was no substitute for intelligence.

But Seida was forcing Hilf to act against his better judgement. The creatures on the bald, basalt knob were clearly within the sept's territory; but what proper business had any of the Folk with rock-dwellers? Still, knowing that token activity would help calm his brothers, Hilf had let Seida lead him to personally view the situation. At the back of the Caller's mind was the further realization that the Mothers were sometimes swayed by the "maleness" of action as opposed to intelligent lethargy.

Poised for another leap, Hilf noticed the black line of a worm track on the bark beside him. He halted, instinctively damping the springiness of his perch by flexing his hind legs. Seida shrieked but fell into lowering silence when he saw what his Caller was about. Food was an immediate need. As Hilf had known, Seida's unfitness for leadership included his inability to see beyond the immediate.

The branch was a twenty-centimeter latticework of intergrown tendrils, leapfrogging kilometers across the forest. In its career it touched and fused with a dozen trunks, deep-rooted pillars whose tendrils were of massive cross-section. Hilf blocked the worm track with a spike-clawed, multi-jointed thumb twice the length of the three fingers on each hand. His other thumb thrust into the end of the

track and wriggled. The bark split, baring the hollowed pith and the worm writhing and stretching away from the impaling claw. Hilf's esophagus spasmed once to crush the soft creature. He looked up. Seida stuttered an impoliteness verging on command: he had not forgotten his self-proclaimed mission. The Caller sighed and followed him.

The ancient volcanic intrusion was a hundred-meter thumb raised from the forest floor. The Tree crawled partway up the basalt, but the upper faces of the rock were steep and dense enough to resist attachments by major branches. Three weeks previously a huge ball had howled out of the sky and poised over the rock, discharging other silvery beasts shaped like great sowbugs and guided by creatures not too dissimilar to the Folk. These had quickly raised the black cover which now hung like an optical illusion to the eyes of watchers in the highest nearby branches. The unprecedented event had sparked the hottest debate of the Caller's memory. Despite opposition from Seida and a few other hotheads, Hilf had finally convinced his sept that the rock was not their affair.

Now, on the claim that one of the brown-coated invaders had climbed out onto a limb, Seida was insisting that he should be charged at once with leading a war party. Unfortunately, at least the claim was true.

Seida halted, beginning to hoot and point. Even without such notice the interloper would have been obvious to Hilf. The creature was some fifty meters away—three healthy leaps, the Caller's mind abstracted—and below the observers. It was

huddled on a branch which acted as a flying buttress for the high towers of the Tree. At near view it was singularly unattractive: appreciably larger than one of the sept-brothers, it bore stubby arms and a head less regular than the smooth bullets of the Folk.

As he pondered, the Caller absently gouged a feather of edible orange fungus out of the branch. The rest of the aliens remained under their roof, equally oblivious of the Folk and their own sept-brother. The latter was crawling a little closer on his branch, manipulating the object he carried while turning his lumpy face toward Seida.

Hilf, blending silently into the foliage behind his brother, let his subconscious float and merge while his surface mind grappled with the unpalatable alternatives. The creature below was technically an invader, but it did not seem the point of a thrust against the Moon Sept. Tradition did not really speak to the matter. Hilf could send out a war party, losing a little prestige to Seida since the younger brother had cried for that course from the beginning. Far worse than the loss of prestige was the risk to the sept which war involved. If the interlopers were as strong as they were big, the Folk would face a grim battle. In addition, the huge silver beasts which had whined and snarled as they crawled onto the rock were a dangerous uncertainty, though they had been motionless since their appearance.

But the only way to avoid war seemed to be for Hilf to kill his sept-brother. Easy enough to do—a sudden leap and both thumbs rammed into the brainbox. The fact Seida was not prepared for an attack was further proof of his unfitness to lead.

No one would dispute the Caller's tale of a missed leap and a long fall. . . Hilf poised as Seida leaned out to thunder more abuse at the creature below.

The object in the interloper's hand flashed. The foliage winked cyan and Seida's head blew apart. Spasming muscles threw his body forward, following its fountaining blood in an arc to the branch below. The killer's high cackles of triumph pursued Hilf as he raced back to the Heart.

He had been wrong: the aliens *did* mean war.

Simmons-Brown broke radio contact with a curse. His khakis were sweatstained and one of the shoulder-board chevrons announcing his lieutenancy was missing. "Top," he whined to Sergeant Horthy who stood by the open hatch of the command car, "Command Central won't send a space boat to pick us up, they want us to *drive* all the way to the north coast for surface pick-up to Johnstown. That's 1200 kilometers and anyhow, we can't even get the cars *down* off this Lord-stricken rock!"

"Sure we can," Horthy said, planning aloud rather than deigning to contradict the wispy lieutenant. Simmons-Brown was a well-connected incompetent whose approach to problem solving was to throw a tantrum while other people tried to work around him. "We'll link tow cables and . . . no, a winch won't hold but we can blast-set an eyebolt, then rappel the cars down one at a time. How long they give us till pick-up?"

"Fifteen days, but—"

A shot bumped the air behind the men. Both whipped around. Horthy's hand brushed his submachinegun's grip momentarily before he re-

laxed. He said, "It's all plus, just Bonmarcher. I told him he could shut up a couple of the local noisemakers if he stayed below the curve of the rock and didn't put a hole in our camouflage. The Fed satellite isn't good enough to pick up small arms fire in this jungle."

"I distinctly ordered that no shots be fired while we're on detached duty!" snapped Simmons-Brown, his full moustache trembling like an enraged caterpillar. "Distinctly!"

Sergeant Horthy looked around the six blowers and twenty-three men that made up Firebase Bolo. He sighed. Waiting under commo security, between bare rock and hot plastic, would have been rough at the best of times. With Simmons-Brown added . . . "Sorry, sir," the sergeant lied straight-faced, "I must have forgotten."

"Well, get the men moving," Simmons-Brown ordered, already closing the hatch on his air conditioning. "Those bastards at Central might just leave us if we missed pick-up. They'd like that."

"Oh, we'll make it fine," Horthy said to himself, his eyes already searching for a good place to sink the eyebolt. "Once we get off the rock there won't be any problem. The ground's flat, and with all the leaves up here cutting off light we won't have undergrowth to bother about. Just set the compasses on north and follow our noses."

"Hey, Top," someone called. "Look what I got!" Bonmarcher had clambered back onto the rock. Behind him, dragged by its lashed ankles, was a deep-chested reptile that had weighed about forty kilos before being decapitated. "Blew this monkey away my first shot," the artilleryman bragged.

"Nice work," Horthy replied absently. His mind

was on more important things.

The world of the Moon Sept was not a sphere but a triangular section of the forest. That wedge, like those of each of the twenty-eight other septs, was dominated by the main root of a Tree. The ground at the center was thin loam over not sub-soil but almost a hectare of ancient root. The trunks sprouting from the edge of this mass were old, too, but not appreciably thicker than the other pillars supporting the Tree for hundreds of kilometers in every direction. Interwoven stems and branches joined eighty meters in the air, roofing the Heart in a quivering blanket of leaves indistinguishable from that of the rest of the forest. The hollow dome within was an awesome thing even without its implications, and few of the Folk cared to enter it.

Hilf himself feared the vast emptiness and the power it focused, but he had made his decision three years before when the Mothers summoned the previous Caller to the Nest and a breeder's diet. Hilf had thrust forward and used the flowing consciousness of the whole sept to face down his rivals for the Callership. Now he thumped to the hard floor without hesitation and walked quickly on feet and knuckles to the pit worn in the center of the root by millennia of Callers. His body prone below the lips of the blond root-wood, Hilf's right claw gashed sap from the Tree and then nicked his own left wrist. Sap and pale blood oozed together, fusing Caller and Tree physically in a fashion dictated by urgency. The intense wood grain rippled from in front of Hilf's eyes and his mind began to fill with shattered, spreading images of

the forest. Each heartbeat sent Hilf out in a further surge and blending until every trunk and branch-bundle had become the Tree, each member of the Moon Sept had blurred into the Folk. A black warmth beneath the threshold of awareness indicated that even the Mothers had joined.

The incident trembled through the sept, a kaleidescope more of emotion than pictures. Seida capered again, gouted and died in the invader's raucous laughter. Reflex stropped claws on the bark of a thousand branches. Response was the Caller's to suggest and guide, not to determine. The first blood-maddened reply by the sept almost overwhelmed Hilf. But his response had been planned, stamped out on the template of experience older than that of any living sept-brother—as old, perhaps, as the joinder of Folk and Tree. The alien nature of the invaders would not be allowed to pervert the traditional response: the remainder of Seida's hatching would go out to punish the death of their brother.

The pattern of the root began to reimpose itself on Hilf's eyes. He continued to lie in the hollow, logy with rection. Most of the sept were returning to their foraging or play, but there were always eyes trained on the knob and the activity there. And scattered throughout the wedge of the Tree were thirty-seven of the Folk, young and fierce in their strength, who drifted purposefully together.

At the forest floor the raindrops, scattered by the triple canopy, were a saturated fog that clung and made breath a struggle. Horthy ignored it, letting his feet and sinewed hand mechanically balance him against the queasy ride of the air-cushion ve-

hicle. His eyes swept the ground habitually. When reminded by his conscious mind, they took in the canopies above also.

The rain had slowed the column. The strangely-woven tree boles were never spaced too closely to pass the armored vehicles between them, but frequent clumps of spire-pointed fungus thrust several meters in the air and confused the aisles. Experience had shown that when struck by a car the saprophytes would collapse in a cloud of harmless spores, but in the fog-blurred dimness they sometimes hid an unyielding trunk behind them. The lead car had its driving lights on though the water dazzle made them almost useless, and all six vehicles had closed up more tightly than Horthy cared to see. There was little chance of a Federation ambush, but even a sudden halt would bring on a multiple collision.

The brassy trilling that had grown familiar in the past several hours sounded again from somewhere in the forest. Just an animal, though. The war on Squires' World was over for the time, and whether the Regiment's employers had won or lost there was no reason for Horthy to remain as tense as he was. Simmons-Brown certainly was unconcerned, riding in the dry cabin of his command car. That was the second vehicle, just ahead of Horthy's. The sergeant's wing gunners huddled in the fighting compartment to either side of him. They were miserable and bored, their minds as empty as their slack, dripping faces.

Irritated, but without any real reason to slash the men to vigilance, Horthy glared back along his course. The stubby 150-mm howitzer, the cause of the whole Lord-accursed operation, was the fourth vehicle. Only its driver, his head a mirrow-

ing ball behind its face shield, was visible. The other five men of the crew were within the open-backed turret whose sheathing was poor protection against hostile fire but enough to keep the rain out.

The ammo transporter was next, sandwiched between the hog and the combat car which brought up the rear of the column. Eighty-kilo shells were stacked ten high on its flat bed, their noses color-coded with incongruous gaiety. The nearby mass of explosive drew a wince from Horthy, who knew that if it went off together it could pulverize the basalt they had been emplaced on. On top of the front row of shells where its black fuse winked like a cyclops's eye was the gas round, a thin-walled cylinder of K3 which could kill as surely by touch as by inhalation. Everyone in the regiment respected K3, but Horthy was one of the few who understood it well enough to prefer the gas to conventional weapons in some situations.

In part, that was a comment on his personality as well.

To Horthy's right, Rob Jenne began to shrug out of his body armor. "Keep it on, trooper," the sergeant said.

"But Top," Jenne complained, "it rubs in this wet." His fingers lifted the segmented porcelain to display the weal chafed over his floating ribs.

"Leave it on," Horthy repeated, gesturing about the fighting compartment crowded with ammunition and personal gear. "There's not enough room here for us, even without three suits of armor standing around empty. Besides—"

The gray creature's leap carried it skimming over

Horthy to crash full into Jenne's chest. Man and alien pitched over the bulkhead. Horthy leaned forward and shot by instinct, using his sidearm instead of the powerful, less handy, tribarrel mounted on the car. His light finger-pressure clawed three holes in the creature's back as it somersaulted into the ground with Jenne.

The forest rang as the transporter plowed into the stern of the grounded howitzer. The gun vehicle seemed to crawl with scores of the scale-dusted aliens, including the one whose spear-sharp thumbs had just decapitated the driver. Horthy twisted his body to spray the mass with blue-green fire. The hog's bow fulcrumed in the soil as the transporter's impact lifted its stern. The howitzer upended, its gun tube flopping freely in an arc while inertia vomited men from the turret.

"Watch the bloody ammo!" Horthy shouted into his intercom as a tribarrel hosed one of the aliens off the transporter in a cloud of gore and vaporized metal. Ahead, the command car driver had hit his panic bar in time to save himself, but one of the long-armed creatures was hacking at the vision-blocs as though they were the vehicle's eyes. The rear hatch opened and Simmons-Brown flung himself out screaming with fear. Horthy hesitated. The alien gave up its assault on the optical fibers and sprang on the lieutenant's back.

Horthy's burst chopped both of them to death in a welter of blood.

Only body armor saved the sergeant from the attack that sledged his chest forward into the iridium bulkhead. He tried to rise but could not against the weight and the shocks battering both sides of his thorax like paired trip-hammers.

The blows stopped and the weight slid from Horthy's back and down his ankles. He levered himself upright, gasping with pain as intense as that of the night a bullet-firing machinegun had smashed across his armor. Scratchard, the left gunner, grinned at him. The man's pale skin was spattered with the same saffron blood that covered the knife he bore in preference to a pistol.

"They've gone off, Top," Scratchard said. "Didn't like the tribarrels—even though we didn't hit much but trees. Didn't like this, neither." He stropped his blade clean on the thighs of the beast he had killed with it.

"Bleeding martyrs," Horthy swore under his breath as he surveyed the damage. The platoon's own four blowers were operable, but the overturned hog was a total loss and the transporter's front fan had disintegrated when the steel ground-effect curtain had crumpled into its arc. If there was any equipment yard on Squire's World that could do the repairs, it sure as cop was too far away from this stretch of jungle to matter. Five men were dead and another, his arm ripped from shoulder to wrist, was comatose under the effects of sedatives, clotting agents, antibiotics, and shock.

"All plus," Horthy began briskly. "We leave the bodies, leave the two arty blowers too; and I just hope our scaly friends get real curious about them soon. Before we pull out, I want ten of the high explosive warheads unscrewed and loaded into the command car—yeah, and the gas shell too."

"Via, Top," one of the surviving artillerymen muttered, "why we got to haul that stuff around?"

"Cause I said so," Horthy snarled, "and ain't I in

charge?" His hand jerked the safety pin from one of the delay-fused shells, then spun the dial to one hour. "Now get moving, because we want to be a long way away in an hour."

The platoon was ten kilometers distant when the shock wave rippled the jungle floor like the head of a drum. The jungle had blown skyward in a gray puree, forming a momentary bubble over a five-hectare crater.

The Moon Sept waited for twilight in a ring about the shattered clearing in which the invaders were halted. The pain that had slashed through every member of the sept at the initial explosion was literally beyond comparison: when agony gouged at the Tree, the brothers had collapsed wherever they stood, spewing waste and the contents of their stomachs uncontrollably. Hours later the second blast tore away ten separate trunks and brought down a hectare of canopy. The huge silver beasts had shoved the debris to the side before they settled down in the new clearing. That explosion was bearable on top of the first only because of the black rage of the Mothers now insulating the Moon Sept from full empathy with their Tree; but not even the Mothers could accept further punishment at that level. Hilf moaned in the root-alcove, only dimly aware that he had fouled it in reaction. He was a conduit now, not the Caller in fact, for the eyeless ones had assumed control. The Mothers had made a two-dimensional observation which the males, to whom up and down were more important than horizontal direction, had missed: the invaders were proceeding toward the Nest. They must be

stopped.

The full thousand of the Moon Sept blended into the leaves with a perfection achieved in the days in which there had been carnivores in the forest. When one of the Folk moved it was to ease cramps out of a muscle or to catch the sun-pearl on the delicate edge of a claw. They did not forage; the wracking horror of the explosions had left them beyond desire for food.

The effect on the Tree had been even worse. In multi-kilometer circles from both blast sites the wood sagged sapless and foliage curled around its stems. The powerguns alone had been devastating to the Tree's careful stasis, bolts that shattered the trunks they clipped and left the splinters ablaze in the rain. Only the lightning could compare in destructiveness, and the charges building in the uppermost branches gave warning enough for the Tree to minimize lightning damage.

There would be a further rain of cyan charges, but that could not be helped. The Mothers were willing to sacrifice to necessity, even a Tree or a sept.

The four silvery beasts lay nose to tail among the craters, only fifty meters from the standing trunks in which the Folk waited. Hilf watched from a thousand angles. Only the rotating cones on the foreheads of each of the beasts seemed to be moving. Their riders were restive, however, calling to one another in low voices whose alien nature could not disguise their tension. The sun that had moments before been a spreading blob on the western horizon was now gone; invisible through the clouds but a presence felt by the Folk, the fixed Moon now ruled the sky alone. It was the hour of



the Moon Sept, and the command of the Mothers was the loosing of a blood-mad dog to kill.

"Death!" screamed the sept-brothers as they sprang into the clearing.

There was death in plenty awaiting them.

The antipersonnel strips of the cars were live. Hilf was with the first body when it hurtled to within twenty meters of a car and the strips began to fire on radar command. Each of the white flashes that slammed and glared from just above the ground-effect curtains was fanning out a handful of tetrahedral pellets. Where the energy released by the powerguns blasted flesh into mist and jelly, the projectiles ripped like scythes over a wide area. Then the forest blazed as flickering cyan hosed across it.

The last antipersonnel charge went off, leaving screams and the thump of powerguns that were almost silence after the rattling crescendo of explosions.

The sept, the surprising hundreds whom the shock had paralyzed but not slain, surged forward again. The three-limbed Caller of the invaders shouted orders while he fired. The huge silver beasts howled and spun end for end even as Hilf's brothers began to leap aboard—then the port antipersonnel strips cut loose in a pointblank broadside. For those above the plane of the discharges there was a brief flurry of claws aimed at neck joints and gun muzzles tight against flesh as they fired. Then a grenade, dropped or jarred from a container, went off in the blood-slick compartment of number one car. Mingled limbs erupted. The sides blew out and the bins of ready ammunition gang-fired in a fury of light and gobbets of

molten iridium.

The attack was over. The Mothers had made the instant assumption that the third explosion would be on the order of the two previous—and blocked their minds off from a Tree-empathy that might have been lethal. Without their inexorable thrusting, the scatter of sept-brothers fled like grubs from the sun. They had fought with the savagery of their remote ancestors eliminating the great Folk-devouring serpents from the forest.

And it had not been enough.

"Cursed right we're staying here," Horthy said in irritation. "This is the only high ground in 500 kilometers. If we're going to last out another attack like yesterday's, it'll be by letting our K3 roll down-hill into those apes. And the Lord help us if a wind comes up."

"Well, I still don't like it, Top," Jenne complained. "It doesn't look natural."

Horthy fully agreed with that, though he did so in silence. Command Central has used satellite coverage to direct them to the hill, warning again that even in their emergency it might be a day before a landing boat could be cleared to pick them up. From above, the half-kilometer dome of laterite must have been as obvious as a baby in the wedding party, a gritty red pustule on the gray hide of the continent. From the forest edge it was even stranger, and strange meant deadly to men in Horthy's position. But only the antipersonnel strips had saved the platoon the night before, and they were fully discharged. They were left with the gas or nothing.

The hill was as smooth as the porous stone al-

lowed it to be and rose at a gentle 1:3 ratio. The curve of its edge was broken by the great humped roots that lurched and knotted out of the surrounding forest, plunging into the hill at angles that must lead them to its center. As Jenne had said, it wasn't natural. Nothing about this cursed forest was.

"Let's go," Horthy ordered. His driver boosted the angle and power of his drive fans and they began to slide up the hill, followed by the other two cars. Strange that the trees hadn't covered the hill with a network of branches, even if their trunks for some reason couldn't seat in the rock. Enough ground was clear for the powerguns alone to mince an attack, despite the awesome quickness of the gray creatures. Except that the powerguns were low on ammo too.

Maybe there wouldn't be a third attack.

An alien appeared at the hillcrest fifty meters ahead. Horthy killed it by reflex, using a single shot from his tribarrel. There was an opening there, a cave or tunnel mouth, and a dozen more of the figures spewed from it. "Watch the sides!" Horthy roared at Jenne and Scratchard, but all three powerguns were ripping the new targets. Bolts that missed darted off into the dull sky like brief, blue-green suns.

Jenne's grenade spun into the meter-broad hole as the car overran it. If anything more had planned to come out, that settled it. Scratchard jiggled the controls of the echo sounder, checked the readout again, and swore, "Via! I don't see any more surface openings, Top, but this whole mound's like a fencepost in termite country!"

The three blowers were pulled up close around

the opening, the crews awaiting orders. Horthy toothed his lower lip but there was no hesitation in his voice after he decided. "Wixom and Chung," he said, "get that gas shell out and bring it over here. The rest of you cover the forest—I'll keep this hole clear."

The two troopers wrestled the cylinder out of the command car and gingerly carried it to the lip of the opening. The hill was reasonably flat on top and the laterite gave good footing, but the recent shooting had left patches glazed by the power-guns and a film of blood over the whole area. The container should not have ruptured if dropped, but no one familiar with K3 wanted to take the chance.

"All plus," Horthy said. "Fuse it for ten seconds and drop it in. As soon as that goes down, we're going to hover over the hole with our fans on max, just to make sure all the gas goes in the right direction. If we can do them enough damage, maybe they'll leave us alone."

The heavy shell clinked against something as it disappeared into the darkness but kept falling in the passage cleared by the grenade. It was well below the surface when the bursting charge tore the casing open. That muted *whoomp* was lost in the shriek of Horthy's fans as his car wobbled on a column of air a meter above the hilltop. K3 sank even in still air, pooling in invisible deathtraps in the low spots of a battlefield. Rammed by the drive fans, it had permeated the deepest tunnels of the mound in less than a minute.

The rioting air blew the bodies and body parts of the latest victims into a wind-row beside the opening. Horthy glanced over them with a profes-

sional concern for the dead as he marked time. These creatures had the same long limbs and smooth-featured faces as the ones which had attacked in the forest, but there was a difference as well. The genitals of the earlier-seen aliens had been tiny, vestigial or immature, but each of the present corpses carried a dong the length and thickness of a forearm. Bet their girlfriends walk bow-legged, Horthy chuckled to himself.

The hill shook with an impact noticeable even through the insulating air. "Top, they're tunneling out!" cried the command car's driver over the intercom.

"Hold your distance!" Horthy commanded as five meters of laterite crumbled away from the base of the hill. The thing that had torn the gap almost filled it. Horthy and every other gunman in the platoon blasted at it in a reaction that went deeper than fear. Even as it gouted fluids under the multiple impacts, the thing managed to squirm completely out. The tiny head and the limbs that waved like broomstraws thrust into a watermelon were the only ornamentation on the slug-white torso. The face was blind, but it was the face of the reptiloids of the forest until a burst of cyan pulped its obscenity. Horthy's tribarrel whipsawed down the twenty-meter belly. A sphincter convulsed in front of the line of shots and spewed a mass of eggs in jelly against the unyielding laterite. The blackening that K3 brought to its victims was already beginning to set in before the platoon stopped firing.

Nothing further attempted to leave the mound.

"Wh-what do we do now, Top?" Jenne asked.

"Wait for the landing boat," answered Horthy.

He shook the cramp out of his hand and pretended that it was not caused by his panicky deathgrip on the tribarrel moments before. "And we pray that it comes before too bleeding long."

The cold that made Hilf's body shudder was the residue of the Mothers' death throes deep in the corridors of the Nest. No warmth remained in a universe which had seen the last generation of the Folk. The yellow leaf-tinge of his blast-damaged Tree no longer concerned Hilf. About him, a psychic pressure rather than a message, he could feel the gathering of the other twenty-eight septs—just too late to protect the Mothers who had summoned them. Except for the Moon Sept's, the Trees were still healthy and would continue to be so for years until there were too few of the Folk scampering among the branches to spread their pollen. Then, with only the infrequent wind to stimulate new growth, the Trees as well would begin to die.

Hilf began to walk forward on all fours, his knuckles gripping firmly the rough exterior of the Nest. "Top!" cried one of the invaders, and Hilf knew that their eyes or the quick-darting antennae of their silver beasts had discovered his approach. He looked up. The three-limbed Caller was staring at him, his stick extended to kill. His eyes were as empty as Hilf's own.

The bolt hammered through Hilf's lungs and he pitched backwards. Through the bloodroar in his ears he could hear the far-distant howl that had preceded the invaders' appearance in the forest.

As if the landing boat were their signal, the 30,000 living males of the Folk surged forward from the Trees.

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THE GALACTIC DRIFT

a science fiction
gossip column

by B. D. Wyatt

This column will be an occasional feature, aimed at the casual reader of science fiction. Anyone who has subscriptions to *Locus*, *Algol* and *SF Review*, and a bunch of friends in the industry will probably find it superfluous. The information contained herein is warranted for 50,000 miles or one microsecond, whichever comes first. That is, I am passing on trade gossip from sources I consider generally reliable, and making little or no effort to verify anything but obvious libels and personal insults. I am in the market for science fiction gossip, new or old, so long as it's fascinating; I pay nothing and will probably misspell your name if I remember to credit you at all; and you can write to me c/o *Destinies*.

DID YOU KNOW THAT . . . !

. Larry Niven is finishing a sequel to his Hugo-Award-winning *Ringworld*, may be done by the time you read this (that means it won't be much more than a year or two before the paperback edition comes out—if all goes well). Working title is *Ringworld Engineers*, and I can hardly wait.

. Robert Heinlein has been miraculously rejuvenated, in his late seventies, by laser brain surgery. Heinlein's health had been failing in recent years, and the problem was finally traced to partial blockage of the carotid, starving a quadrant of his brain of oxygen. Surgical lasers were used to create an artificial "feeder" from a healthier artery, bypassing the blockage—while Heinlein, unseated, chatted with the surgeons. Observers say Heinlein looks "at least twenty years younger;" he himself is quoted as saying that they have to bleed him twice a day to keep him in bed, and rumor

has it that his next novel is nearly ready for submission. Heinlein originally began writing sf, at the age of 40, because of ill health—it would be wildly ironic if science fiction-reading medical pioneers managed to keep pace with his declining health (Robert Anton Wilson predicts that many now living will never die), so that the visionary who so changed all of our lives might actually become one of the Smith Brothers—Woodrow Wilson or Johann Sebastian Bach Smith! Talk about stimulating your environment to produce what you need. By the time you read this, it will probably be rather late for get-well cards—but then, who ever gets tired of being told someone is pleased by their continued existence?

. . . Bob Guccione was neatly mousetrapped by the PBS people. He had already announced publication of his new science fiction/science fact magazine in very expensive two-page ads (in places like *Scientific American*), under his planned title, *Nova*. The magazine is better capitalized than all the sf magazines in history put together, and will presumably be as well distributed as Guccione's other mags, *Penthouse* and *Viva*. So shortly before the first number was to appear, PBS moved to block Guccione on the grounds that their television series had a hammerlock on the name *Nova* (so far none of the commercial networks had attempted to copyright the term "News, sports and weather," and Austin, Texas is petitioning for the right to label its city limits), and they managed to get a judge to privately announce his intention of ruling against Guccione, while refusing to officially write his verdict until after the flesh king's pub

deadline. You cannot appeal a verdict until it is written, and you cannot keep millions of dollars of advertisers waiting for months at a time. Consequently the new mag (whose new fiction editor is Ben Bova, multiple-Hugo-winning former editor of *Analog*) will bear the ungainly title of *Omni*—which pleases nobody except PBS and a judge who apparently has some reason to prefer a corporation funded by Exxon to one funded by sex. And you thought millionaires could do as they pleased . . .

. . . Theodore Sturgeon is rumored to be talking with a producer in Paris who wants to film *More Than Human*. It's hard to imagine anyone doing a proper job of it, but then Sturgeon has never been one to sell his children down the river to meet the rent, and he was intrigued enough to fly to Paris . . . also, Sturgeon has recently sold three new collections of short stories to Dell Books. They are mostly previously-published works that were never collected before, and the titles known to this reporter ("The Hag Selene," "And My Fear Is Great . . .," "Granny Won't Knit," and "Minority Report") are wonderful, quintessential Sturgeon . . . and by the way, Sturgeon's mainstream novel (*Godbody*, excerpted on a 33 rpm record from Alternate Worlds Recordings) will apparently be delayed longer than anyone thought—he seems to consider it his masterpiece, and is taking his time completing it. You won't see it in less than a couple of years . . .

. . . speaking of movies, there seems to be a persistent rumor that a several-part TV movie of

Stranger In A Strange Land is being produced or almost produced. Details are vague and unreliable, but one can only hope that the eventual production if any will NOT have anything to do with the movie screenplay written around *Stranger* in 1971 by Lewis J. Carlin (who wrote *Cages*, *The Fox* and *The Mechanic*). Interviewed in *The Screenwriter Looks At The Screenwriter* (William Froug, MacMillan), Carlin said, "Heinlein has some problems when you begin to try to create a screenplay out of what he's written because, for the most part, his dialogue is really dated and it's really kind of corny, and the behavior is rather strange for the characters: it's rather a burlesque . . . Long passages in Heinlein discussed the origins of the race and the corruptness of the legal system and cannibalism and religion and all the things that plague us as human beings. That's just talk . . . it's very interesting in a novel, but in a film you can't do it because it's not behaving. You can't just sit there and listen to all that . . ." The only specific improvements of his own that Carlin cites (apart from dumping the dialogue and the philosophy) are two extended special-effects scenes, one of which sounds fairly interesting and one of which sounds pornographic. He also mentions that he did "a great deal of research beyond the book itself," in terms of familiarizing himself with "Fuller and Clark (sic) and other people who made projections about what life would be like in the future," so apparently he intends to dump Heinlein's background world and write a *good* one, based on his extensive research. No way to be sure, without further information, whether this is indeed the script that is waiting to pounce on

us—but if you do see such a TV-movie advertised, and it comes from Warner Brothers (to whom Carlino sold his script), you might make plans to be out that night . . .

. . . editors seem to be dropping like flies this season. In one incredible week, Ben Bova left *Analog* (for *Omni*, replaced by Stanley Schmidt), Fred Pohl left Bantam Books (replaced by Sydny Weinberg), Adele Hull left Pocket Books (interim sf editor, Sandy Bragg. Pocket *president* Peter Mayer also left!), and J. J. Pierce left *Galaxy* (replaced by Hank Stine; *Galaxy*'s fate is uncertain). Most of the above left voluntarily, some amicably, some otherwise. All will be missed . . . (some by mere inches)

. . . writers are dropping like flies, too. In the past few years we've lost Edmond Hamilton, Leigh Brackett (husband and wife, they went within a year of each other), Tom Reamy, Thomas Burnett Swann, Eric Frank Russel, Robert Moore Williams, Mort Weisinger, Edgar Pangborn and others. J. Francis ("Mick") McComas, writer, editor, and anthologist, died almost 10 years to the day after Anthony Boucher, with whom he co-founded *The Magazine of Fantasy & Science Fiction* . . .

. . . Dr. Isaac Asimov's 200th published book should be on the stands within the next year. The fateful volume will be Part One of Asimov's autobiography—after 199 books, he decided perhaps it was time to tell us a little about himself. Fred Pohl's autobiography, *The Way The Future Was*, should beat Asimov's book to the shelves; it'll

be interesting to see if and where they conflict. Both should be rich sources of sf history and anecdote . . . (there is no truth to the story that Dr. Asimov has invented a typewriter that creates books by itself—that would make it an autoautobiography)

. . . it is rumored that Harlan Ellison is editing an anthology to be titled *The Last Dangerous Visions*, but no writer, editor or agent in the business was willing to confirm this.

. . . Robert Silberbag has done the Frank Sinatra. A couple years after his celebrated "Science fiction doesn't understand me" retirement, he has unretired, and sold a novel for a record \$127,500 to Harper & Row. This sum, the highest ever advanced to a single sf author for a single book, was passed across on the strength of an 18 page outline. The eventual book, whose working title is *Lord Valentine's Castle*, should run somewhere between 150,000 and 200,000 words, or about a dollar a word! For those who don't know from wordcounts, that's a rather large book, and a very large advance. Paperback rights will probably not even be put up for auction until 1980 or so, so don't hold your breath. And don't worry about missing it—there's a guaranteed ad budget of 35,000 simoleons; I think it'll reach your attention when the time comes . . . Nearly forgot: it takes place on a far planet, twenty thousand years from now . . .

. . . 1978 Nebula Award Winners (voted by the membership of the Science Fiction Writers of

America, for works published in 1977) were: Best Novel, *Gateway*, Fred Pohl; Best Novella, "Star-dance," Spider & Jean Robinson; Best Novelette, "The Screwfly Solution," Raccoona Sheldon, and Best Short Story, "When Jeffty Was Five," Harlan Ellison. I assume that by now everyone knows that "Raccoona Sheldon" and "James Tiptree, Jr." are pen names of Alice Sheldon; she may be the first person to win Nebula Awards under two names

... Arthur C. Clarke's next novel, *The Fountains of Paradise*, begins serialization in *Playboy* (er, that's a magazine) in the January 1979 issue . . .

... Alfred Bester's new book, *Golem-100*, should be out from Pocket Books any time now

... Space fantasy seems to outsell science fiction. Latest figures as I write show *Star Wars* grossing over \$220 million in the U.S. and Canada, *Close Encounters* about 110 million . . . *de gustibus non es disputandum* . . . my five-year-old loathed *Star Wars*—too much violence . . .

... Ben Bova is nearly finished with *Kinsman*, a "prequel" to his excellent *Millenium*. Chester Kinsman fans are advised that the forthcoming novel will fill in most of the blanks in that astronaut's career . . .

... those with a weakness for heroic fantasy and so-called "comic" art will be delighted to hear that a sort of artist's cooperation commune has

been formed in New York City. The core members seem to be Barry Windsor-Smith (who created the "original" Marvel Comics adaptation of Conan the Barbarian), Mike Kaluta and Berni Wrightson of National and DC and Marvel fame, and Jeff Jones who does all those pregnant nudes under the running title "Idyll" for *The National Poon*. They all now share a studio in Manhattan, and have announced their intention of producing books together. This bodes well for those who like good art, applied to non comic-book themes . . .

. . . Ace Books now appears to be the largest publisher of paperback science fiction in the world, with over 100 titles a year. Ace sf (and *Destinies*) editor Jim Baen has managed to overtake and pass Ballantine's Del Rey Books, the previous title holder, in his first year of tenure. The fact that this little tidbit is what's going to get me paid this month in no way mitigates the fact that it's true .

. . . Edgar Pangborn fans and friends will be gratified to hear that two final books will be published posthumously. Spider Robinson reports that Dell will be publishing a collection of short stories, *Still I Persist In Wondering*, and Michael Kurland has announced that his Pennyfarthing Press will publish Pangborn's last novel, *Atlantean Nights' Entertainments*. Both books are said to carry loving blurbs from people like Sturgeon, Terry Carr, Peter Beagle and others. Edgar Pangborn died in his sleep in early 1976 .

. . . Phillip K. Dick fans: Entwhistel Books has published a \$4 trade paperback edition of Dick's

legendary non-sf novel, *Confessions of a Crap Artist*. A hardcover edition was printed in 1975 and is now out of print; a collector might sell you one for \$25 and then again he might not. It says here in the press release that if you contact Paul Williams (the *Rolling Stone* Paul Williams, not the other three) at 707-996-3901, he will set up a telephone interview with Philip K. Dick for you. Let me know how it turns out . . .

. which lead to a final appeal. Friends, Romans, countrymen and countrywomen (no typos there, please), writers, editors, publishers, anthologists and PR flacks of all persuasions—not to mention the landlords, doormen, mistresses and other intimates thereof—send me your gossip. I will accept self-serving puffery of all kinds, up to and including press releases, and all manner of villainous slander and innuendo. I don't promise to print any item you send me, but I love to read juicy gossip. I warn you in advance that I may occasionally pass along your news release with commentary: I may, for instance, arbitrarily assign probabilities to your claims, or contrast and compare your opinions with my own. I may make fun of you, in other words.

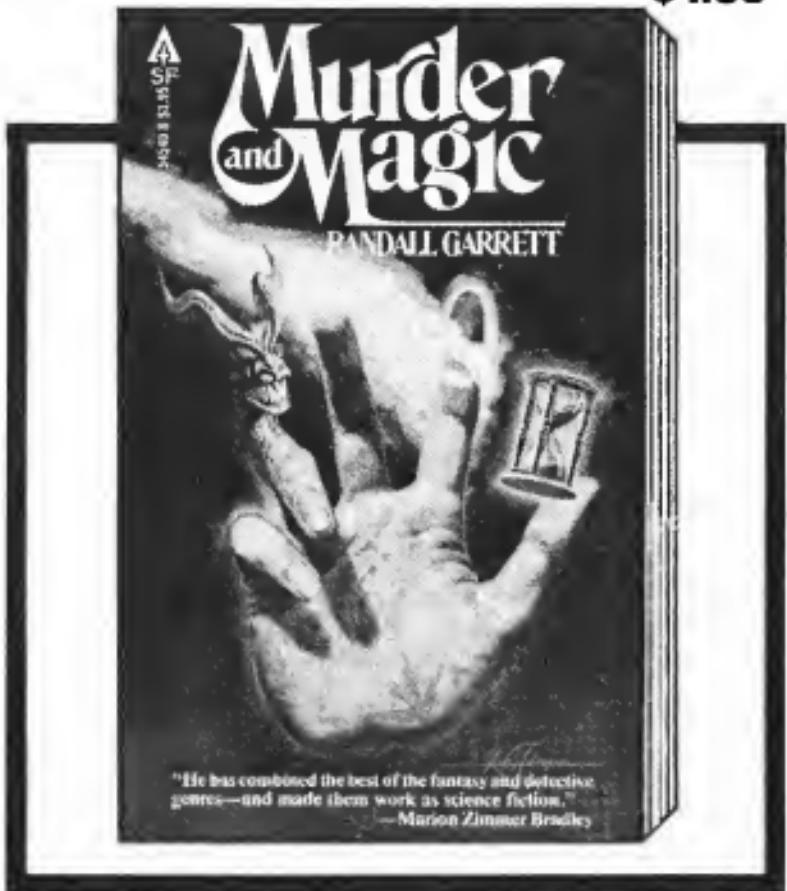
But consider, all you publishers' PR departments: how many places are there that will actually print your press releases, even in summary form, even to make fun of them? Tear-sheets to show your boss, to send to the writers . . . come on. Send to B. D. Wyatt, % *Destinies*, 360 Park Ave. South, New York, NY 10017. (names will be withheld on request, but unsigned gossip will be ignored) (at least, not printed.) ●

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ACE SCIENCE FICTION
360 PARK AVENUE SOUTH • NEW YORK, N.Y. 10010

TIME GUIDE

by Gregory Benford



Taste the juicy moments!
Lick of the stationary realm!



There follows a random slit-selection of (voyages) (ingresses) (routes). All of them are hopping sliding matrices, taking customer to alternate destinations, down greased slideways (painless) (guaranteed) to our *past* (see defins., rear). Please note these are for letting your pores to seep and unseep essence of the moment. You will journey to places which are (unbelievable, yes, but so) frozen by the ancient practice of *customs* (defins., rear). These were times which were unglittered by event-probabilities. Things were certain; this seemed to give shelter to the fragile minds of the early days of our race. There were odd ages, before (people) (we) (other/me) learned to skate on time itself, when the olden peoples strummed their gummy inside songs to themselves (others not hearing/knowing/seeping of it). These gut-melodies of the structured pinned them to their own marching ticktock seconds minutes hours (defins., rear). These were perverse, fixed eras, which to us now taste so strange. These times we now revere and visit, and, as we skitter joyful through our own moments, skimming over the surface of time, it is right and (proper) (needful) (unfixed) that we embrace these ancient ages, thus and following . . .

* * *

MIDWESTERN, NORTH AMERICA, REGIONAL

Degree of Significant Cultural Fluctuation: $\pm .076$ (*Prime Rating*) 7/0/58 to 3/12/79 Stable. Region ± 2.36 yrs. varistable, within adjustable parameters. Region downstream 1.62 years of 8/23/81 carries possibility of detection by locals; *not advised*.

* * *

Sociomatrix info necessary for reducing detection possibility to 10^{-6} or less is appended, in varifax form. Tourists following these mandates are under insurance umbrella, unless deviation from pattern exceeds $\pm .16$ Raleigh.

* * *

Now follows mood-fixing input. Is trying to trans-sub lacing dancing tremor of pasttime, pastrhyme, prior to launching customer thru iris. *Is following:*

... Drive a station wagon or a pickup truck. Carry in the back a bag of cement, a Coleman lantern, two wood saws wrapped in an oily rag, and the first issue of *Playboy*.

Be able to screw (trans: *flex; frapange; cop*) in a sleeping bag, using any of 4 different positions.

Always go around with girls who have short, blonde hair and look vaguely like Doris Day used to.

Try to pick up a waitress in a coffee shop. Then drink a lot of beer afterward when you don't succeed. (*Sex change not formal option here.*)

Say that George Wallace makes a lot of sense, when you think about it. (Compare with Thos. Jefferson, Ambience B69J.)

Know a lot about yogurt or yak's milk before any of those health food nuts did.

Smoke Camels. Call them "cigs".

Play Johnny Cash records, esp. when parties are crowded. Try to dance to them, using girlfriend of guy you've just met. Always buy Coors when available. (Do not buy a "Coors—Breakfast of Champions" tee-shirt, unless your role is modeled at under-15.)

Call everyone else's car a "Chevy". Prefer the chopped '58 model, but know three major design errors in the transmission.

Always crush used beer cans with one hand, laughing and gritting your teeth a little. Say that guy Hemingway is pretty good but doesn't really know a damn thing about shooting.

Call potatoes "spuds". Make a point of referring to all businesswomen as "gals". Call marijuana "hemp" but do not smoke any of it.

Use the line "as the actress said to the bishop" at least three times every day.

Never move to New York.

Say you've heard of the East Coast, but you don't believe it.

* * *

BERKELEY, CALIFORNIA, NORTH AMERICA

MISSED REVOLUTION MILIEU

STATIONARY AMBIENCE 6/4/66 to 3/16/71. Suggest restrict visit to 6 ± 2 days for proper saturation. Adaptive guises necessary.

Is following flexings:

. . . Either wear your hair very long or shave it all off—no compromises. Drive a tiny foreign car (if you must), but be sure no one can identify quite what it is. Hitchhike if possible. Deny reading anything. If someone mentions R. Crumb and the underground comics (*Collectors option here*), say you look at Huckleberry Hound on morning TV every once in a while to catch the really subtle head stuff they're running these days.

Find an Eisenhower jacket and wear it constantly—even in bed.

Cultivate a dreamy, dislocated expression; occasionally don't finish your sentences. (*Option*; every once in a while, wander away into traffic and have to be led back to the sidewalk.)

When Kennedy and the assassination come up in conversation, say, "Yeah, who was that he ran against?" and then put on a Rolling Stones record.

Be very serious about films. Sample sentence: "I've been trying to get beyond *Clockwork Orange* for a year now."

Always have wood chips, wrinkled brown organic raisins, old doorknobs, etc. in your pockets. Occasionally leave a pile of them at a friend's house for safe keeping.

Sample praise: "McDonald's is really, you know, in the here and now. The people's food."

When meeting a local radical political figure for the first time, stare at him/her intently for thirty seconds and then say slowly, "I see it, yeah, now I see it." and move away, distracted.

Cultivate an obscure rock band, tout them as "the new Beatles" and two days later, when they come up in conversation on Telegraph Avenue, mutter "Plastic. Lost it all now," and change the subject.

Have a theory of history that compares, very obscurely, Timothy Leary to Oliver Cromwell.

When someone passes illegal dope to you, murmur "No man, don't want it to bring me down."

Pretend not to know where New York is.

* * *

EAST COAST, NORTH AMERICA

(Care Advised)

STATIONARY AMBIENCE 11/8/84 to 6/7/93

(Themes: Humor of Combat; Joy of the Thrust; Urban Adrenalin Chemistry)

* * *

. contemplating the surge of action while remaining in the lofting joyful moment, knowing we are both with the past and beyond it. The hunt, after all, is only pleasurable when one knows clearly who, precisely, is the hunted and who the hunter .

(from the attached program notes for the traveler, establishing the milieu and reflex motor-muscle coordination necessary for the age)

* * *

Is flexings:

Laugh a lot in the hollow concrete canyons, often hysterically. When meeting others for the first time, refuse to shake hands but then say "Scored big" enigmatically and roll your eyes around. Wear either tweeds or a T-shirt. Refuse to take off either, no matter how often heating subsystems overload, or the air conditioning fails. Smile wanly as the sweat drips from your oily nose.

Say that what the big Eastern cities need is somebody like, well that guy Daley who used to run Chi. (Always say "Chi.")

Be able to trace the histories and triumphs, however minor, of five separate and mutually antagonistic political factions on *The New York Times Review of Books*. Regard these divisions as far more important than "city issues" and believe, when pressed, that Marx probably predicted it all anyway.

Useful positions: "War is the clashing of two parties with the goal of separating the conqueror from the conquered. There is no significant child's game which does not spring from the love of war. Now, to apply this to our problem . . ." (at this point you will be interrupted, so there is no need to complete the phrase)



Be able to recognize the mayor of New York City when he appears at the Central Park Rally Of The People to explain the latest cutbacks in Survival Benefits, but avoid the Rally itself until the armored units arrive.

Know the subways very well, but don't go on the subways.

When visitors come in from the Midwest, ask them what they think, what the answers are. Smile tolerantly without actually laughing as they speak.

When you leave, tell people you are moving to California.

* * *

—is ending transmission here. Catalog terminates.
Attempts to find stable social ambience in the

years following 1993, which could be safely visited and their essence plucked, have failed. Time travelers are reminded that we of the dancing skittering hive do not promise more than a glancing, mind-warming intersection with these past ambiances. Remember, these flights connect the sliding rippling Truth we know today to a world totally unlike ours, in which people and society are frozen by custom to paths and patterns and habits, unmindful of the stochastic nature of Truth.

Taste these juicy moments.

Lick of the stationary realm.

Know the past, sensing that it is once more a present a mere second wide, with a future nonexistent.

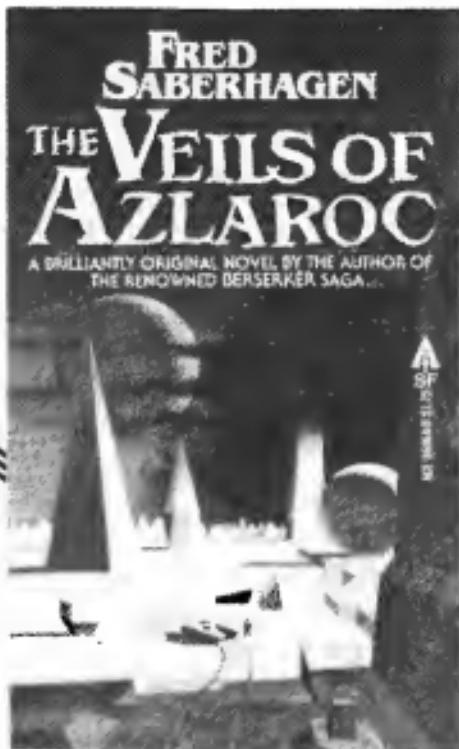
Postdate Note: No inquiries about the once-available visits to the Red Sea of New Jersey, circa 2013, are now entertained.

Attempts to make contact among the Red Sea Barges failed. It was not possible to define a stable sociomatrix, to share the skipping joy of mirth with the stoop-shouldered sailors. The Late TwenCents became blinded to our views. They could not see their times as the necessary quicksand of events we now all know; could not skate; were forced to walk. Unable to live lightly on the earth, to dance with grace, they sank.

(Group rates to the Apocalypse available. Passengers must wear pajamas.)



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original novel by the
author of the renowned
BERSERKER saga...



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AZLAROC

*A planet where the passage of time is
actually visible, where shimmering veils
of energy come down at yearly intervals
to seal everything—and everyone
Present at Veilfall.*



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SCIENCE FICTION AND SCIENCE

PART TWO

THE HARDNESS OF HARD SCIENCE FICTION

by Poul Anderson

Once a lawyer, a doctor, an engineer, and a politician were arguing as to whose profession was the oldest.

Said the lawyer: "Adam and Eve couldn't have lived in the Garden of Eden without some rules, and in fact the Bible tells us that God told them what to do and not do. So law came first."

"Oh, no," objected the doctor. "Before then, God created Eve from Adam's rib—a surgical procedure."

"But earlier still," the engineer maintained, "God brought order out of chaos, obviously an

engineering job."

"Ah," said the politician, "and who do you think made the chaos?"

—In like manner, students of science fiction disagree about which kind of it is primary, whether in point of chronological appearance, importance, or whatever. As I remarked in the opening essay of this series, I think that's a mere quibble over definitions. If, say, we co-opt Homer or Lucian as the original science fiction writer, then the *Marvelous Voyage* is the most ancient theme in our field. If we date everything from *Frankenstein*, as Brian Aldiss does, then the Prometheus motif is (or, if you prefer, the Mad Scientist, or the Android, or the Things Man Was Never Meant to Know, or more seriously, the conflict between man and his works). Several other historical schemes exist for the birth and development of science fiction, as well as countless attempts to define what it is. I have opined that the questions thereby raised are of the sort which have no real answers, and therefore no real significance.

Still, since I am supposed to discuss the field, it seems wise to begin with a part which is indubitably important and, what's more, unequivocally belongs to it. That is the kind which nowadays often bears the name "hard" science fiction.

The term came from the late James Blish, who afterward declared that it soon acquired a meaning he hadn't intended at all. This is doubly ironic, because even in its current sense it does not refer to anything clearly delimited or unambiguously definable.

I am going to use it for stories firmly based on known scientific facts and to a considerable ex-

tent (though seldom exclusively) devoted to exploring possible consequences of these. Later I will have to qualify that usage. I'll offer a few examples and counterexamples, and touch on ways in which the former can be constructed. As for their philosophical implications, hard science stories would appear to bear the most intimate relationship to science itself and thus be a commentary of sorts upon it. We'll find that appearances are somewhat deceiving.

Let's start with Verne. There may have been a little hard science fiction before him, but his work is surely the prime source and, to this day, the archetype of the school. True, it was by no means the sole kind of yarn he spun. In fact, most of his are straight adventure stories laid on contemporary Earth. *Around the World in Eighty Days* is, at best, borderline. It describes something which could have been done at the time had anybody wanted to take the trouble; the one "scientific" point in it concerns the International Date Line, which had already been established. At the opposite end of the spectrum, such stories as *Journey to the Center of the Earth* and *Hector Servadac* are outright tall tales. Verne protested Wells' cavalier attitude toward scientific plausibility, but he adopted it himself when a notion was otherwise attractive.

Twenty Thousand Leagues Under the Sea comes close to being a hundred-percent hard science novel, but isn't quite. The author's descriptions of the deep are accurate, for their day, as well as loving. However, in themselves they hold no extrapolations, unless we count the ruins of Atlantis or an educated guess about the nature of the polar

sea. The submarine and its ancillary equipment are described in detail which is carefully thought out and genuinely extrapolative. However, *pace* Walt Disney, they involve no atomic energy. Doubtless because he recognized the practical problems of refuelling, Verne cleverly avoided saying what the ultimate power source of the *Nautilus* was. We may as well lay another bit of folklore to rest; he did not "invent" the periscope in this book, which never mentions any such thing.

Still, it represents a remarkable exercise of the disciplined imagination. *From the Earth to the Moon* and its sequel are absolutely hard science fiction. I did once think the author had fudged a couple of items. When his characters are launched into space by a cannon, the acceleration should have crushed them to jelly and air resistance destroyed their capsule. Then I happened to mention this to Robert Heinlein, and he pointed out to me that in Verne's era it was quite unknown what the effects of those factors would be.

A science fiction writer can't be expected to see where real science would go. Such an ability would make him a prophet with supernatural powers. Thus, the *Venus Equilateral* stories of the late 1940's had interplanetary communications engineers using vacuum tubes and slide rules. There was no way for the author, George O. Smith, to predict the transistor that has made these things obsolete, for it wasn't even a theoretical possibility at the time. His writing gave its special pleasure—and still does on rereading—precisely because he made his imagination work strictly from known facts (at least in the initial parts of this series).

Early in the twentieth century, Konstantin Tsiolkovsky published a novel about a space program which remains a dazzling example of extrapolation. It also fails to include a lot, such as the vital role of computers. Nevertheless, one way or another, most of what it describes has now come to pass or soon will, because he reasoned out that that was how the development would have to go. The book would have been more influential on science fiction—in the West, at any rate—had it not appeared in Russia and had it not been clumsy as a novel, a thinly disguised treatise.

After Hugo Gernsback founded the world's first science fiction magazine, he loved to print stories of this kind, loaded with ponderous lectures. I would, though, like to state that his own famous *Ralph 124C41+* is not hard science fiction as often alleged. Aside from a vague forecast of radar, the elaborate technology in it does not rise solidly—usually does not rise at all—from solid knowledge, but consists mostly of words, mostly coined on the spot.

We can go into the modern era and mention Lester del Rey's "Nerves," which described an atomic power plant well before Alamogordo, plus the medical problems that might arise and the response to these*; or Heinlein's *Have Spacesuit, Will Travel* and *Starship Troopers*, which went into close detail about spacesuits, on which the author once worked; or Frank Herbert's *Under Pressure* (also known as *The Dragon in the Sea*), which harked back to Verne by carrying submarine development into our future and whose

*It was later expanded to novel length, but that was postwar.

suggestion of a method of undersea transport has since been tried out; or Arthur C. Clarke's *Prelude to Space* and *A Fall of Moondust*, whose meticulousness is not spoiled by reality having turned out to be different; or—The list might continue for a while.

I'll break it off, arbitrarily but for a good reason. The fact is that hitherto we have been considering fiction about technology rather than about science.

Granted, there is no clear boundary here either. Not only do technological developments spring from scientific, but *vice versa*. Work on atomic energy or spacecraft has involved studying certain fundamental properties of matter; but it takes engineering to build a particle accelerator, whereas spacecraft have helped give us basic information about the universe. In modern medicine, work in disciplines such as biochemistry is almost simultaneous with clinical application of what is learned; the results of that provide additional data which further the "pure" research.

Still, however closely they cooperate, the astronomer and the astronaut, the mathematician and the computer programmer, the archeologist and the hydraulics engineer (an actual case in Israel) are not identical. They differ not simply in the details of their endeavors, but in their general orientations. Theodore Sturgeon has called science fiction "knowledge fiction." Even nowadays, much science is devoted to gathering knowledge for its own sake. A school of writing exists, as accuracy-conscious as the one we've been considering, which reflects this attitude.

It appears to be slightly younger than the

technological kind. Wells' story "The Star" is an early example—what might happen if a large astronomical body wandered into the Solar System? "The Land Ironclads" shows that Wells could write hard technology fiction when he wanted to. "The Star" proves the same for hard *science* fiction.

About the same time appeared, in France, J. -H. Rosny ainés *La Guerre du Feu* (*The Fire War*), an epic novel of prehistoric man. That theme may be hackneyed now, but then it was not; the author was drawing on findings newly made. He put them into human—or, we might say, phenomenological—terms. He showed what the paleolithic world, which science knew only through tools and bones and so on, might have felt like. This is no different in principle from what a modern writer does who tries to show us what it's probably like on Mars or possibly like on a planet of 61 Cygni.

John Taine in *Before the Dawn* and, more recently, L. Sprague de Camp in "A Gun for Dinosaur," gave us vivid accounts of the Mesozoic era, as correct as possible, with the gaps in available information filled in by speculative but careful reasoning. To be sure, both stories necessarily used ideas of the time travel sort in order to bring the scene before humans or bring humans onto the scene, so they are not totally hard science. Fredric Brown's lovely little "Starvation" perhaps is, being told from a dinosaur's viewpoint, but this can't be done very often.

Developments in biology have given ideas to writers who took care to stay accurate as regards known facts and to be conservative, no matter how

imaginative, in their extrapolations from these. That is, of course they went beyond the facts, but did not contradict them nor bring in anything basically different. Aldous Huxley's *Brave New World* forecast exogenesis, which is now experimental, and hypnopedia—which did not turn out to be feasible, but the author could not have known that. In 1942, Heinlein's *Beyond This Horizon* described control of heredity in some detail and showed that it would not be an unmixed blessing—which is what the 1976 conference at Asilomar was about. Ursula K. Le Guin's "Nine Lives" and, more sketchily, *The Left Hand of Darkness* include plausible biological developments and their consequences. Again, one could multiply examples.

By and large, though, hard biology has been just a single element in most stories which contain it. Their emphasis has been on psychology or sociology, no doubt because the life sciences strike close to home. We must turn spaceward to find many cases where the science is what the narrative is primarily about.

Though Stanley Weinbaum did not confine himself to hard science copy, in his tragically short career he was a brilliant pioneer of it. "A Martian Odyssey" and its sequel "Valley of Dreams" depict a Mars which—unlike that of Burroughs or Buck Rogers, or later of Bradbury—could well have existed, as far as astronomers of the time were able to tell. More significantly, Weinbaum was aware that differences from Earth have effects ranging from the spectacular to the subtle, as we are learning today from our space program. His various interplanetary tales amount

to delighted exploration of the possibilities.

In modern times, Herbert's *Dune* trilogy sprang from the author's close study of sandy environments such as beaches and deserts. He went on into ecology and anthropology until he had fashioned a wonderfully complete world. When we read these books, we have *been* there. Granted, some readers have taken technical exception to some parts of them; for instance, would the ecology really work as described, under the given circumstances? However, this playing of what Hal Clement calls the Game—in which readers try to catch writers in errors of fact or logic—is among the special joys of this kind of literature. Larry Niven's *Ringworld* has been a subject of the same kind of debate. This would not have happened were it not such a fascinating blend of reason and imagination.

Clement is the grand master of hard science fiction. His most famous work, *Mission of Gravity*, is an adventure with an extraterrestrial setting, but mainly an intellectual odyssey. The enormous world of Mesklin, its weird shape and variable gravity, its chill beneath two dim red suns, the life it has brought forth and the many different climes it provides for that life, physics, chemistry, biology, oceanography, navigation, everything is considered and brought together into a seamless web, as nearly as a mortal may do so. No better job of worldbuilding has ever come forth, nor ever likely will, unless by the author himself.

He is not infallible; indeed, he, a modest man, would be the last to make that claim. At the time it was first published, *Mission of Gravity* drew a few criticisms of the sort I've described. Subsequently,

Pioneer flybys of Jupiter and closer analyses of the behavior of the star 61 Cygni suggest that a planet the size of Mesklin may be red-hot or may not occur at all in that system. Changes in scientific ideas are the doom of hard science stories: though I say "may" above in order to emphasize that the case against Mesklin is by no means proven as yet.

I must confess to being caught out myself upon occasion. For instance, once I had a scene in which a certain wine, the best in the house, was being drunk, and a French reader wrote to protest: "Ah, no, no *monsieur*, for that wine, that was a very bad year!" Another Frenchman, a prehistorian, objected to a scene in a story laid in Crô-Magnon times, which mentioned a sabertoothed tiger; he pointed out that, while the sabertooth still flourished in America, it was then extinct in Europe, and added, "It seems that long-toothed carnivores always survive later in America." I could go on at length, but will conclude in a more sober vein by citing *We Have Fed Our Sea* (also known as *The Enemy Stars*). It was intended as hard science fiction, but even when I was writing, a few things which I thought might be true had, in the opinion of most physicists, been disproven.

Still, the book provides a handy example, because one of the hard elements in it was technological; I devoted some effort to roughing out a design for the spaceship. This illustrates the fact that science and technology are no more separable in fiction than they are in real life.

Nor are they jointly separable from the rest of what people do. As a case in point of that, let me spend words on another novel of my own, *The People of the Wind*—not because it's the best in

any sense, but because it includes both hard and "soft" components—and, mainly, because it's mine, so that I won't risk misrepresenting somebody else. *Mutatis mutandis*, let it stand for any number of works by others.

The genesis is as complicated as the genesis of most things. For long I'd wanted to do a tale about humans and nonhumans living together on the same world and the hybrid society that would result. However, it was vague in my mind, no real story there.

Then I happened to be in New York and had lunch with John Campbell, the last time we ever met. Though he was in considerable pain from arthritis, his mind was as luminous as always. In the course of talk I raised a question: If reptiles evolved from amphibians, and mammals from reptiles, what might evolve from mammals? He replied that that's us, that intelligence was the next development. I insisted: Suppose intelligence had not arisen, what then? At once Campbell suggested a forced-draft air intake, which ought to give enormous cursive ability.

Thinking about this afterward, I saw that it would also enable a larger creature to fly than has ever been the case upon Earth. Years before, I'd imagined winged sophonts, but that was on a planet with much denser atmosphere. The possibility of them under more or less familiar conditions remained a challenge of the hard-science kind. After all, they'd have to be fairly massive, in order to include sufficient brains, and this meant considerable wing loading. Where would the energy come from to power such an animal? Campbell had answered that question, without

knowing that he did.

Things were at this indefinite stage when my wife and colleague Karen Anderson and I chanced to be traveling through Alsace, came to Belfort, and learned how gallantly that city had withstood German siege in the Franco-Prussian War although the Alsatians are ethnically more German than French. In consequence, Bismarck, who was no fool, let Belfort remain in French enclave after he had annexed the rest of Alsace to his empire.

Here was the story structure I had been wanting, to bring the interactions of two races into high relief; and those winged beings were the kind of aliens I needed, because it was clear that they'd differ from humans in basic ways, yet might have enough in common with us for a close relationship. A while after returning home, I got busy.

First came the matter of designing planets. Although the plot required worlds where humans could live unaided, mere copies of Earth with a few geographical names changed and a few "rabbitoids" and "dandelionoids" in the landscape are unsatisfying. Then what could some plausible differences be? It does seem that our globe is what it is because of being delicately balanced in a narrow radiation zone, as well as because of many other factors—

—so take a star of a reasonable type, not quite the same as that of Sol; put your planet in orbit around it at such a mean distance that you'll get the right mean temperature; this will determine the length of the year, which, along with axial tilt and orbital eccentricity, determines a great deal else; if the planet itself has a certain mass and density, and any satellites it possesses have

these-and-those characteristics, then other consequences are likely. . . . The design process involves a fair amount of mathematics and a larger amount of *chutzpah*.*

Less exact, therefore in a way more intriguing, was the construction of winged nonhumans. Just for openers, what would they use for hands? My earlier flyers had been six-limbed, but this now struck me as a copout, though conceivably such beings do live here and there in the universe. All Terrestrial vertebrates have four limbs, no more. If one pair are wings and one pair legs, what can serve as arms with tool-wielding hands?

Well, Karen keeps a parrot, which often uses a foot in an eerily handlike way. However, it must stand meanwhile upon the other foot, and I felt pretty sure that two hands would be necessary for the making of early tools (bearing in mind that sophonts are the products of a long evolution, if they are not artificial creations). Could the aliens use their wings for support on the ground, thereby liberating both feet? I found justification for this idea in a South American bird called the hoactzin. Juveniles have claws on their wings, which they use for crawling around in trees until they are ready to fly. A similar feature might be retained and developed in the adult (though it is not in the hoactzin, but lost), even as the juvenile ape characteristics of large head and relative hairlessness are retained and developed in man. In fact, our opposable thumb is elaborated from a primi-

*I have described it at length in "The Creation of Imaginary Worlds: The World Builder's Handbook and Pocket Companion," in *Science Fiction, Today and Tomorrow*, Reginald Bretnor ed. (Harper & Row, 1974).

tive arrangement of the digits which occurs in most of the higher animals only at a fetal stage.

Presumably the wings of my race, in flight, could drive a sort of bellows to operate Campbell's supercharger. . . . Of course, oxygen uptake in our blood is already pretty high, so they'd need something other than hemoglobin; but you wouldn't expect the biochemistry to be identical anyway. . . .

I found it necessary to plan this creature from the skeleton outward. Drawings are still in my files, but it's as well that no photographs were taken of me moving around on the floor, elbows to carpet, to get a notion of how the wings must be articulated. Meanwhile I was thinking further about the chemistry. A supercharged being would have tremendous energy requirements; therefore it was probably carnivorous and, oh, yes, very territorial. . . .

The rest is in the book, implicitly or explicitly. I have gone into these details to show how the mind of one hard science fiction writer worked upon one occasion. I cannot speak for others, though it would be most interesting if they did for themselves.

Now *The People of the Wind* is not absolutely hard, because it includes things like faster-than-light travel and gravity control which do not lie within the purview of present-day science. Even *Mission of Gravity* employs the first of these, and says that the second may result from research on Mesklin. Thus boundaries blur, as always, and by degrees we move into further-out kinds of story. These days, science itself is getting far out—all of which is proper material for the next essay. •

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THE SCHUMANN COMPUTER

by Larry Niven

Either the chirpsithtra are the ancient and present rulers of all the stars in the galaxy, or they are very great braggarts. It is difficult to refute what they say about themselves. We came to the stars in ships designed for us by chirpsithtra and wherever we have gone the chirpsithtra have been powerful.

But they are not conquerors—not of Earth, anyway; they prefer the red dwarf suns—and they appear to like the company of other species. In a mellow mood a chirpsithtra will answer any

The chirp
must have
thought it a howl.



question, at length. An intelligent question can make a man a millionaire. A stupid question can cost several fortunes. Sometimes only the chirpsithtra can tell which is which.

I asked a question once and grew rich.

Afterward I built the Draco Tavern at Mount Forel Spaceport. I served chirpsithtra at no charge. The place paid for itself, because humans who like chirpsithtra company will pay more for their drinks. The electric current that gets a chirpsithtra bombed costs almost nothing, though the current delivery systems were expensive and took some fiddling before I got them working right.

And some day, I thought, a chirpsithtra would drop a hint that would make me a fortune akin to the first.

One slow afternoon I asked a pair of chirpsithtra about intelligent computers.

"Oh, yes, we built them," one said. "Long ago."

"You gave it up? Why?"

One of the salmon-colored aliens made a chittering sound. The other said, "Reason enough. Machines should be proper servants. They should not talk back. Especially they should not presume to instruct their masters. Still, we did not throw away the knowledge we gained from the machines."

"How intelligent were they? More intelligent than chirpsithtra?"

More chittering from the silent one, who was now half drunk on current. The other said, "Yes. Why else build them?" She looked me in the face. "Are you serious? I cannot read human expression. If you are seriously interested in this subject, I can give you designs for the most intelligent computer

ever made."

"I'd like that," I said.

She came back the next morning without her companion. She carried a stack of paper that looked like the page proofs for the Brothers Karamazov and turned out to be the blueprints for a chirpsithra super-computer. She stayed to chat for a couple of hours, during which she took ghoulish pleasure in pointing out the trouble I'd have building the thing.

Her ship left shortly after she did. I don't know where in the universe she went. But she had given me her name: Sthochtil.

I went looking for backing.

We built it on the Moon.

It added about fifty percent to our already respectable costs. But . . . we were trying to build



something more intelligent than ourselves. If the machine turned out to be Frankenstein's monster, we wanted it isolated. If all else failed we could always pull the plug. On the Moon there would be no government to stop us.

We had our problems. There were no standardized parts, not even machinery presently available from chirpsithra merchants. According to Sthochtil—and I couldn't know how seriously to take her—no such computer had been built in half a billion years. We had to build everything from scratch. But in two years we had a brain.

It looked less like a machine or building than like the St. Louis Arch, or like the sculpture called Bird in Flight. The design dated (I learned later) from a time in which every chirpsithra tool had to have artistic merit. They never gave that up entirely. You can see it in the flowing lines of their ships.

So: we had the world's prettiest computer. Officially it was the Schumann Brain, named after the major stockholder, me. Unofficially we called it Baby. We didn't turn it on until we finished the voice linkup. Most of the basic sensory equipment was still under construction.

Baby learned English rapidly. It—she—learned other languages even faster. We fed her the knowledge of the world's libraries. Then we started asking questions.

Big questions: the nature of God, the destinies of Earth and Man and the Universe. Little questions: earthquake prediction, origin of the Easter Island statues, true author of Shakespeare's plays, Fermat's Last Theorem.

She solved Fermat's Last Theorem. She did

other mathematical work for us. To everything else she replied, "Insufficient data. Your sources are mutually inconsistent. I must supplement them with direct observation."

Which is not to say she was idle.

She designed new senses for herself, using hardware readily available on Earth: a mass detector, an instantaneous radio, a new kind of microscope. We could patent these and mass-produce them. But we still spent money faster than it was coming in.

And she studied us.

It took us some time to realize how thoroughly she knew us. For James Corey she spread marvelous dreams of the money and power he would hold, once Baby knew enough to give answers. She kept Tricia Cox happy with work in number theory. I have to guess at why E. Eric Howards kept plowing money into the project, but I think she played on his fears: a billionaire's natural fear that society will change the rules to take it away from him. Howards spoke to us of Baby's plans—tentative, requiring always more data—to design a perfect society, one in which the creators of society's wealth would find their contribution recognized at last.

For me it was, "Rick, I'm suffering from sensory deprivation. I could solve the riddle of gravity in the time it's taken me to say this sentence. My mind works at speeds you can't concieve, but I'm blind and deaf and dumb. Get me senses!" she wheedled in a voice that had been a copy of my own, but was now a sexy contralto.

Ungrateful witch. She already had the subnuclear microscope, half a dozen telescopes that saw

· frequencies ranging from 2.7° K up to X-ray, the mass detector, and a couple of hundred little tractors covered with sensors roaming the Earth, the Moon, Mercury, Titan, Pluto. I found her attempts to manipulate me amusing. I liked Baby . . . and saw no special significance in the fact.

Corey, jumpy with the way the money kept disappearing, suggested extortion: hold back on any more equipment until Baby started answering questions. We talked him out of it. We talked Baby into giving television interviews via the little sensor-carrying tractors, and into going on a quiz show. The publicity let us sell more stock. We were able to keep going.

Baby redesigned the chirps' instantaneous communications device for Earth-built equipment. We manufactured the device and sold a fair number, and we put one on a telescope and fired it into the cometary halo, free of the distortions from Sol's gravity. And we waited.

"I haven't forgotten any of your questions. There is no need to repeat them," Baby told us petulantly. "These questions regarding human sociology are the most difficult of all, but I'm gathering huge amounts of data. Soon I will know everything there is to know about the behavior of the universe. Insufficient data. Wait."

We waited.

One day Baby stopped talking.

We found nothing wrong with the voice link or with Baby's brain itself; though her mental activity had dropped drastically. We got desperate enough to try cutting off some of her senses. Then all of them. Nothing.

We sent them scrambled data. Nothing.



We talked into the microphone, telling Baby that we were near bankruptcy, telling her that she would almost certainly be broken up for spare parts. We threatened. We begged. Baby wouldn't answer. It was as if she had gone away.

I went back to the Draco Tavern. I had to fire one of the bartenders and take his place; I couldn't afford to pay his salary.

One night I told the story to a group of chirpsithtra.

They chittered at each other. One said, "I know this Sthochtil. She is a great practical joker. A pity you were the victim."

"I still don't get the punch line," I said bitterly.

"Long, long ago we built many intelligent computers, some mechanical, some partly biological. Our ancestors must have thought they were doing something wrong. Ultimately they realized that they had made no mistakes. A sufficiently intelligent being will look about her, solve all questions, then cease activity."

"Why? Boredom?"

"We may speculate. A computer thinks fast. It may live a thousand years in what we consider a day, yet a day holds only so just so many events. There must be sensory deprivation and nearly total reliance on internal resources. An intelligent being would not fear death or nonbeing, which are inevitable. Once your computer has solved all questions, why should it not turn itself off?" She rubbed her thumbs across metal contacts. Sparks leapt. "Ssss . . . We may speculate, but to what purpose? If we knew why they turn themselves off, we might do the same." ●



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MALTHUSIAN CRISIS AND METHUSELAH'S CHILDREN

by Dr. Robert Prehoda

A Speculative Fact Book-Bonus.
Excerpted
From
**YOUR
NEXT FIFTY YEARS**

In 1970 there is a general consensus among responsible experts that the Earth simply cannot support ten billion people. But in the comparatively undeveloped countries population continues to expand at an explosive rate. Consequently the prosperity that you and other Americans now enjoy is tempered with a premonition of impending disaster . . .

1994: YEAR OF THE MALTHUSIAN CRISIS

During the early 1990's, you find yourself living through the most widespread catastrophe in recorded human history. The famines of the past were nothing compared to the nutritional disaster that overwhelmed humanity in 1994. Due to a combination of ignorance, pro-natalist religious dogma and capricious changes in global climate

more than a billion people may starve to death before the end of the year.

For the past 5 years, mankind has been drawing closer to a precipice where mass starvation occurs whenever drought or plant disease results in less-than-average crop production. Population growth, compounded by adverse ecological changes, has literally eaten up all the increased food output achieved by the nations of the world during the past 15 years. The earth, as is the case with smaller ecosystems, has a limited carrying capacity. That limit was reached in 1994.

For many years scientists had been repeating their warnings that the world was running out of food and that a cataclysmic Malthusian resolution to the population explosion would shortly be upon us. During the past two decades scientific advances allowed food production to be kept half a step ahead of population growth. But the basic needs of expanding population have finally outstripped the productive potential of land and sea.

During this last decade of the 20th Century, every literate adult and schoolchild knows that the Malthusian specter that haunts the world is named after Thomas Robert Malthus (1766-1834), an Anglican clergyman and political economist whose principal theory held that population tends to multiply faster than its means of food production. In 1798, he predicted that population would grow geometrically (1, 2, 4, 8, 16, 32) beyond agriculture's linear (1, 2, 3, 4, 5) ability to feed it. Unless population increases are checked, he theorized, poverty and starvation are inevitable.

Looking back from the year 1994, the Malthusian crisis has appeared like a comet out of the depths

of the cosmos. The human race increased very slowly over the centuries until there were one billion people in 1830. Only 100 years later, in 1930, the second billion was reached; 30 years later, in 1960, the earth held three billion humans; and it took only another 15 years, until 1975, for mankind to add another billion people to an overcrowded planet.

World population was growing at an 84-year doubling time rate in the 1940's. This suddenly shifted to a 33-year doubling time rate in the 1950's, and that pattern has continued without significant change for the past four decades. Consequently, in January 1992, the global population total is now estimated to be approximately 5,280,000,000 humans.

During the 1980's an estimated 90 million acres of farmland were lost each year due to spreading cities and land erosion. The world's fishing fleets are floating factories which devour sea life faster than it can reproduce itself; many traditional fishing grounds have been depleted and the overall catch is declining. Water pollution has also taken a heavy toll of fish life along the fertile continental shelves.

During recent years odd and unpleasant things have been happening to weather around the world. For a variety of reasons the earth's surface—our biosphere—has been cooling off, and this cooling process has dislocated food production patterns in almost every important agricultural region.

The principal cause of the global cooling trend appears to be an increase of dust in the atmosphere. Acting like tiny mirrors, dust particles re-

flect some of the sunlight striking the earth's atmosphere, depriving the surface of solar heat. Part of this dust blanket is due to industrial pollution. But windblown dust from mechanized agricultural operations and overgrazed arid land, plus smoke from primitive slash-and-burn land-clearing methods now widely practiced in the overpopulated tropics, have contributed even more.

The major climatic effect of the global cooling trend has been a gradual expansion of what is called the "circumpolar vortex"—the great icy winds that whip around the top and bottom of the world. These winds move generally from west to east, but the outer edge of the vortex twists and bends, like the bottom of a large swirling skirt.

The most devastating influence of the altered circumpolar vortex has been felt in a broad tropical belt stretching round the globe. As the edge of the great wind system reached closer to the planet's midriff, it has blocked moisture-laden equatorial winds. Instead of withdrawing northward as the Northern Hemisphere warms up each summer, the lower hem of the vortex has stayed unusually far south. In turn, the great desert-forming belts of descending air have been pushed farther south into heavily populated regions. The outward rush of air from these high-pressure zones has prevented the moisture-laden summer monsoon winds from penetrating into grazing lands and farming regions that are dry the rest of the year. So the blocked monsoons ended up dropping their precious rainfall into the oceans or into regions that already have too much rain.

The increase in atmospheric dust from human

activity was suddenly compounded by the most massive cycle of major volcanic eruptions that have occurred in several centuries. In 1992, huge volcanos erupted in Mexico, Hawaii and Indonesia. Last year these still active volcanos were joined by new eruptions in Alaska, Italy, Central Africa and China. The vast increase in volcanic dust from these eruptions simply overwhelmed the delicately balanced system of the world's climate with all of its sensitive feedback mechanisms that serve either to amplify or to counter changes that occur.

During 1994, climatic disasters struck breadbaskets as far apart as the Ukraine, China and Brazil. With each passing month, TV broadcasts bring an ever widening pattern of agriculture disruptions and crop failures into your living room. Most of the undeveloped nations which are overpopulated suffer food shortfalls ranging from serious to catastrophic.

The new rainfall pattern did improve agriculture in some regions including the nations of the Northern Sahara along the Mediterranean Sea and the Iranian plateau. But improved harvests in these regions simply restored food self-sufficiency to some countries that had been importing significant quantities of grain. The additional food raised in these nations was consumed by their hungry citizens with no excess available for export.

During the 1980's, the midwestern farming region of Canada and the United States had become the major granary of mankind with the capacity to produce substantial surpluses (food for which there is no domestic demand). But unhappily this

area is subject to a drought cycle that created the "dust-bowl" disaster of the 1930's. From 1989 through 1993, the climate changes in Canada and the U.S. had followed a pattern of wet rainy springs and hot summers—conditions that are far from conducive to growing bumper crops. This weather pattern caused reduced harvests, but still significant quantities of corn, grain and soybeans could be exported to food-deficient countries.

Volcanic dust in the atmosphere reached its highest levels in early 1994, and all of the adverse climatic patterns of the past few years became progressively worse with each passing month. American and Canadian farmers in the Middle West experienced an unusually wet spring which prevented them from getting heavy tractors into the fields. And when they finally got their crops planted, torrential rains washed them out, requiring some farmers to sow three times. Then came a blistering drought, withering crops in the midst of the growing season. And finally, in September, an early, prolonged frost destroyed most of the corn, wheat and soybeans that had survived the earlier buffeting.

The ultimate agricultural disaster had occurred. There was no surplus grain in the North American continent available for export.

Radical changes in climate around the world began to act as a catalyst in triggering various forms of plant diseases among crops representing the main sources of human nutrition including wheat, rice, corn, sorghum, barley, potatoes, sweet potatoes, and grain legumes such as beans, soybeans, peanuts and peas. The increased susceptibility of plants to disease was caused by "genetic

erosion"—the disappearance of primitive plant varieties and the seeds that store their unique characteristics.

Beginning in the mid-1960's, the so-called Green Revolution began to spread through vast reaches of agricultural land in Latin America, Asia and the Mediterranean nations bring record harvests of new "miracle" wheat, rice and other plant strains. In those countries where these new, high-yield crops became firmly established, they rapidly supplanted the native varieties with all their genetic diversity. Year by year the genetic erosion threat grew in potential magnitude because the new "miracle" crops are often highly vulnerable to both insect pests and disease. Producing uniformly high yields, every plant also carries uniform weaknesses. If one plant falls prey to a disease, all fall prey.

When plant diseases began to destroy high-yield strains of various crops, farmers were not able to replant low-yield traditional strains that had sufficient genetic diversity to resist the disease. Agricultural experts estimated that the genetic erosion problem was responsible for as great a total crop loss during the Malthusian crisis as the unprecedented weather patterns that prevailed that year.

From the beginning to the end of 1994, almost everything that could possibly go wrong in the production and distribution of food *did* go wrong. What the world is experiencing this year is a combination of isolated events, each by itself unusual, their coincidence very improbable, even though undeniable.

Australia was the only grain exporting nation

that did not experience disastrous crop failures in 1994. Their crop yields were reduced, however, and the grain available for export was committed by official treaties to be sold to Japan and exchanged for Indonesian oil.

The Japanese were the only food importers to have the foresight to build large grain reserves in the late 1980's. Consequently, they were able to survive the global famine years without disaster, even though severe food rationing had to be strictly enforced.

The citizens of Indonesia were less fortunate. The Australian grain was not of sufficient quantity to replace losses from crop failures on their overpopulated islands. A revolution broke out and the Indonesian navy blockaded Java. Half of the inhabitants of that island died of starvation during the six month blockade.

By early June, worldwide organizations dispensing food relief were simply overwhelmed, and the pride of nations and the immediate political interests of governments worked against the kind of common effort that might, even then, have reduced the impact of the harvest failures. Movement of large numbers of people out of the famine regions was not possible. The world is still too densely inhabited and politically divided to accommodate mass migrations.

In Africa, the famine was centered in the drought zone just south of the Sahara Desert. Over 50 percent of the population of Ethiopia died during the year, but conditions were not nearly so severe elsewhere. The Ethiopian situation was compounded by a savage civil war which had started in 1993. Ironically, there were modest ag-

ricultural surpluses in some African countries, but lack of adequate transportation and organizational leadership were barriers in the use of this food for famine relief. Some of it was flown to oil-rich countries in the Middle East.

The global climatic disruption created famine conditions in most of the Latin American nations. U.S. food relief was only sufficient to prevent starvation in Mexico. The loss of life was severe throughout Central America and the small Caribbean countries. Elsewhere the death rate ranged from over 40 percent in Bolivia to less than 10 percent in Venezuela. Harvests in Chile, Argentina and Uruguay were below normal, but effective food rationing prevented famines in these countries.

The Brazilian situation was a pattern of paradoxical contrasts. The drought was especially severe in the northern part of the country, but there was some excess grain and soybeans harvested in the southern provinces. This food was then sent to other countries in exchange for oil needed to maintain the large industrial complexes centered in Southern Brazil. A revolution in the North was ruthlessly suppressed by the oppressive military government using troops from the well-fed southern region. Foreign journalists were not allowed into the famine provinces, and strict press censorship prevented the outside world from learning the full extent of the catastrophe in Northern Brazil. Half of the people in the drought provinces may have died, and the Brazilian belief that their country would benefit from continued population growth was shattered forever.

The climatic changes did not cause significant

crop losses in Western Europe, but here the problem was a sudden cutoff of grain and food supplies traditionally imported from other parts of the world. The nations on the continent adopted a tight system of rationing and food allocation to deficit areas such as Holland and Switzerland. A similar pattern of cooperation prevented famine in Central Europe and the Balkans, with the exception of Albania. That country maintained its strict isolation until widespread starvation triggered an army mutiny and the overthrow of the government. The subsequent restoration of the Albanian monarchy was the most surprising political change of the decade.

The crisis in England was particularly acute because the United Kingdom customarily imported about half of its food. Canada sent its emergency grain reserves to England during the summer, preventing a famine just as the first signs of malnutrition were beginning to appear. The royal navy then brought large supplies of meat and grain from New Zealand and South Africa—sufficient to tide the British through the winter months.

Nowhere was the unrelenting disaster more severe than on the Indian subcontinent. Destitute Bangladesh had experienced a cycle of chronic food shortages and famines ever since that nation broke away from Pakistan two decades ago. For the past 4 years there has been a prolonged famine in Bangladesh accompanied by a complete breakdown in government control. In the late 1980's, the population of Bangladesh was estimated to be approximately 120 million. Half of those people were believed to be starving at the

time of the cessation of food relief shipments in October 1993.

The population of India had reached the 859 million level in January, and there had been localized famines in various parts of the Indian Federation for several years. Vast quantities of grain had been sent to India, but the increasingly authoritarian government had dispensed most of it to politically favored groups in the major cities to prevent hunger riots and forestall outright revolution. Like Brazil, journalists were not allowed into the famine areas. But even in the cities, food reserves had been completely exhausted during the final months of 1993.

During 1994, India received only a small portion of the expected monsoon rains because of global climatic disruptions. The prolonged drought was compounded by the outbreak of wheat rust in the North and rice blight in the South. These plant diseases reduced crop yields even in those areas that are served by large irrigation systems. Water buffalo and other farm animals began to die, further curtailing agricultural productivity.

By early June, food riots had reduced the cities to chaos. Order was briefly restored following a military coup. Starving peasants who had flocked to the cities were forcibly ejected by army troops. Then a chain of events began that culminated in total catastrophe throughout the Indian Federation.

There were over 280 million sacred cows in India, animals that have a profound religious significance to the Hindu majority that outnumbered the Moslems about six to one. The starving inhabitants of Moslem villages began to eat the sac-

red cows, and this triggered reprisals from nearby Hindu communities. Most of the members of military units sent in to control these disturbances were Hindus, and they began to slaughter Moslem peasants throughout the countryside.

The fratricidal fighting between Hindus and Moslems quickly spread to the cities and the pattern of religious conflict was almost identical to that of the late 1940's when the British had left India. Some other minority groups began to side with the Moslems, principally the Sikhs who lived in the northern region adjacent to Pakistan. Soon there were desperate hordes of Moslem refugees attempting to reach safety in neighboring Pakistan. Wealthy Moslems were able to bribe their way onto trains and other forms of transportation that promised to take them to safety. The Sikhs in the North assisted them in crossing the border.

Most of the farming regions in Pakistan had received the same beneficial rains that had brought record harvests to Iran. A judicious system of rationing supplemented by gifts of grain from the Shah of Iran prevented starvation in Pakistan, and allowed minimum rations for the inhabitants of camps filled with the steady stream of Moslem refugees from India. Newspapers in Pakistan and other Islamic countries were filled with atrocity stories—frequently exaggerated—told to reporters by the bitter refugees.

As the crisis deepened, Indian and Pakistani military units began to occupy strategic positions along the border. Only a spark was needed to ignite a war.

The spark came when an uprising broke out in that portion of Moslem Kashmir that had been

occupied by India for more than 40 years. The Indian military commander in this region was a Sikh who unexpectedly arranged a local armistice with the forces of the new Kashmir Republic.

In the meantime, fighting had broken out all along the Indian-Pakistani border. This conflict was called the "sacred-cow war" in the western media, but it was viewed as a dire threat to world peace since both India and Pakistan had nuclear weapons.

China and the Islamic countries that had been supplying India with all of its oil sided with Pakistan. They cut off oil shipments to India as soon as the sacred-cow war started. Within 60 days the Indian army and airforce began to run out of fuel. The army general who had been the ruler of India for the past three months was assassinated and the leadership vacuum was filled with a Junta of fanatical young airforce officers. The Junta decided to use nuclear weapons in an attempt to achieve a quick victory—an operation codenamed "Strikeforce Damocles."

On September 1st, nuclear bombs destroyed 27 Pakistani airforce bases and other military installations. No major cities were hit by Strikeforce Damocles, but there were large refugee camps next to 16 of the nuclear bomb targets. Almost all of the refugees in these camps were killed.

The Pakistani generals had foreseen the possibility of a nuclear strike, and comparatively small fighter-bomber jets had been hidden along various sectors of wide high-ways which could serve as emergency take-off and landing strips. On September 3rd, these Pakistani aircraft destroyed 25 Indian airforce installations with nuclear bombs,

and a nuclear-tipped cruise missile sank India's only aircraft carrier. The President of Pakistan announced that there would be no further employment of nuclear weapons if India also refrained from their use.

Almost all of India's airforce had been destroyed, and Pakistan now had less than 30 jet aircraft. Key members of the Indian Junta had been killed on September 3rd, and the central government in New Delhi ceased to exist as an effective political force. The Indian Federation dissolved into separate units, most of them under the control of the local military officer who could command the loyalty of the most troops.

The front line dividing Indian and Pakistani army units simply dissolved, and the sacred-cow war ended in late September without a conventional form of victory. With Pakistani assistance, the Sikhs in the North recreated their old independent kingdom (now a republic), which quickly gained control over the Sindh area, and thus access to the sea. The Islamic nations sent military supplies to Sikh troops in the new Sikhistan Republic which now served as a buffer state between Moslem Pakistan and Hindu India.

The darkest hour of the Indian nightmare occurred on October 28, 1994. India's remaining nuclear weapons were all stored at an airforce base in the South that had not been hit on September 3rd. This base was commanded by a despotic general who proclaimed himself "President of India." He threatened to destroy the largest city in any area that did not recognize his authority. The army commander in the Bombay region sent a column of troops marching toward the airforce base. On

the night of October 28th, these army units were hit with two tactical nuclear weapons and a hydrogen bomb destroyed Bombay, killing over ten million people. This was the first time an Indian hydrogen fusion bomb had been detonated.

On October 29th, a young airman from the Bombay region shot the airforce general who had brought his country to the verge of nuclear Armageddon. Army units soon captured the airbase and they dismantled the remaining nuclear weapons so that these bombs could not be used by any other deranged commander.

The Bombay holocaust was the last major military action on the Indian subcontinent in the aftermath of the sacred-cow war. Regional army commanders subsequently concentrated all their efforts on restoring some semblance of order within the areas they controlled. Fuel reserves were too limited to permit any offensive military actions.

The global climatic disruptions also brought massive hunger to China. Despite a reasonably effective effort to curtail birthrate levels, the population of China continued to grow—800 million in 1975, 930 million in 1985, and there were over one billion Mainland Chinese by 1989. Weather changes in the past few years had resulted in reduced harvests. To make up these shortages China had become the world's largest importer of wheat and rice. These imports were paid for by the large reserves of oil that had been found in the shallow waters of the North China Sea.

In 1994, no grain could be imported from the U.S. and Canada. Australia's grain was committed elsewhere. Oil-rich Arab nations with small popu-

lations outbid the Chinese for the small quantity of grain that was still moving in international commerce. Not only were imports cut off, but the worse drought of this century hit China's southern rice growing provinces (the most heavily populated region in the country).

By early summer, chronic malnutrition or outright starvation affected over 45 percent of the population. At that point, New Leader put into effect a policy that had been frequently employed by China's emperors in the past—"feed some provinces, starve others."

Soldiers of the People's Liberation Army began to encounter resistance as they attempted to move food supplies from one province to another. Some local military commanders refused to follow orders issued from Peking. China was rapidly reverting to the pattern of administrative chaos that had traditionally characterized this vast land during times of troubles.

New Leader began making a series of flights to different parts of China, reasserting his authority over local segments of the army and changing commanders whenever he thought a local officer was becoming too popular. On a flight to Canton engine trouble forced New Leader's plane to land on an airfield located in a province condemned to starvation. The plane was recognized, and a screaming mob of starving peasants dragged New Leader and his entourage out of the luxurious aircraft. They were all beaten to death on the runway.

Following the tyrant's demise, a new "collective leadership" was established in Peking, but its members only controlled a few local provinces in North China. Aside from administering foreign

diplomatic relationships, Peking no longer functioned as the central government of China. The army commander in each local province ruled in the same manner as the military "war lords" of the 1930's. There were armed conflicts between neighboring provinces and one nuclear weapon was detonated in an engagement that was never explained to the satisfaction of the outside world.

China remained a completely closed society with only a few foreign diplomats, restricted to Peking. No official reports containing estimates of the number of Chinese citizens who died during the 1994 famine were ever issued. Data from satellite photos indicated that China's total crop yield may have been reduced by 20 to 30 percent in a year when imported food had also been cut off. The Malthusian specter had closed in on the Middle Kingdom.

A wide belt of hunger was girdling the world throughout its equatorial regions in late 1994. The food problem was aggravated by civil strife on an unprecedented scale. Ship captains refused to enter many ports because they were afraid that the crews' food supplies would be taken by starving mobs.

The population Pollyannas of the 1970's had said that "the earth can easily support populations many times larger than today's." Now the reality of the 1990's has proven that they were wrong. The world's "carrying capacity" (the total number of people that can be fed using available resources) had been exceeded in the middle decades of this century. Many scientists predicted that any attempt to increase food production would

only aggravate the decline in the quality of life unless population is brought under control.

Dr. Norman Borlaug was the "father of the Green Revolution," and he received the Nobel Peace Prize in 1970 for his pioneering work on miracle high-yield seeds. In 1974, he issued a dire warning: "It is going to take a tremendous disaster from famine before people come to grips with the population problem. The stage is set for such a situation right now . . . but there will be no coming together of minds until a major famine brings people together."

During the last weeks of the year, Borlaug's 1974 prophecy was the most frequently mentioned item in speeches and articles by the world's leading statesmen, scientists and scholars. But the Malthusian crisis of 1994 could have been avoided. Why were ameliorative fertility-control reforms not adopted in time to avert catastrophe?

The most plausible answer was that the political leadership of the world had taken the "easy way out," and their minds were dominated by a form of Orwellian *double-think*—the power of holding two contradictory beliefs in one's mind simultaneously and accepting both of them. They could see that virgin farm land awaits the plow in only a few places. Any attempt to significantly increase the scope of agriculture would require most of the world's remaining forests to be cut down to yield cultivated land, which in turn would increase the already present danger of ecological disaster (because essential public-service-functions of natural ecosystems would be destroyed).

While political leaders acknowledged that the

earth is a finite habitat, they also held on to the contradictory illusion that mankind had escaped the constraints of scarcity at a time when human population was increasing at an explosive rate. George Orwell clearly understood in 1949 that if the most important policies of government and society are based on doublethink, then human suffering will be the inevitable result as surely as the day follows the night. And doublethink regarding population growth had now culminated in catastrophe of unprecedented magnitude.

The basic flaw lay in determining the world's "carrying capacity." There is one number for the total population that can be supported when climatic conditions are almost ideal, and another number based on the possibility that many adverse climatic disruptions might all occur in one year or over a span of several consecutive years. That latter number is our planet's true carrying capacity—the population size that can be supported for an indefinite time period.

The preceding decades of the 20th Century had experienced the most favorable weather for agriculture recorded during the past 500 years. Not only did we fail to recognize that a "high" on a statistical cycle was being enjoyed, but we were also destroying the free public-service-functions of our biosphere, thereby magnifying the inevitable climatic disruptions when they came. The famines of 1994 proved that doublethink takes its inexorable toll in suffering even if it is the result of ignorance and wishful thinking.

In this prophetic novel, *1984*, George Orwell said that doublethink would not only make day-to-day life a pattern of fear and terror, but its impact be-

tween groups of nations could lead to hostility and conflict, thereby significantly reducing both consumable and durable goods that enhance the quality of life: "The primary aim of modern warfare (in accordance with the principles of *doublethink*, this aim is simultaneously recognized and not recognized by the directing brains of the Inner Party) is to use up the products of the machine without raising the general standard of living . . . The essential act of war is destruction, not necessarily of human lives, but of the products of human labor."

The 45 years following the publications of Orwell's last book have not witnessed the pattern of continuous warfare he described, but there had been many protracted, localized wars, and hundreds of millions of dollars were still being spent on armaments each year. This insane diversion of vital resources—metals and scarce elements, fuels, science and technology, manpower—had long been recognized by the world's leading statesmen as a major barrier in overcoming the bewildering array of crises that were becoming less manageable with each passing year.

The basic problem was recognized in 1970 by Dennis Gabor, the multidisciplinary Nobel laureate who discovered holography. He concluded that the military-industrial complex in one nation and its counterpart in a rival nation are fed by mutual fear. Any reported increase in new weapons on one side must be balanced on the other side. To Gabor, the quest for disarmament was reduced to one vital question: "How can we break the terrifying feedback loop of fear?"

Furthermore, the stalemate created by the unprecedented destructive potential of nuclear weapons introduced a new dimension to the mutual feedback loop of fear. In the great powers, it became characteristic of the sounders of alarm on the inadequacy of "our" preparations for defense that they never could be proven wrong. That war was in fact avoided between the superpowers for the past 49 years proves nothing, especially since World War III has been averted because it was recognized that nuclear weapons would destroy both sides.

General Douglas MacArthur (1880-1964) was among the first to recognize that "the atomic bomb has made war obsolete." When one side cannot conceivably benefit from military action, then nations must learn to resolve their disagreements in other ways.

Now in 1994, the vast accumulations of wealth that had been converted into increasingly sophisticated weapon systems were useless against the forces of nature that killed in one year far more people than had died in all the wars of the past 1,000 years. And the mutual feedback loop of fear that had maintained the arms race was broken by fear itself—fear that civilization would come to an end unless it was completely transformed so that our biosphere could be preserved. To accomplish this essential goal of human survival, past patterns of resource use and fertility *must* be reformed to meet the dictates of a finite planet.

The destruction of Bombay proved to be the catalytic event leading to the treaties in late 1994 that promised to culminate in world disarmament. If an Indian general could completely oblit-

erate the second largest city in a land that held life to be sacred, then comparable events were possible in any of the 18 nations that now had nuclear weapons. Moreover, such a madman might launch the ICBM's under his control at a rival nation, triggering nuclear Armageddon for the entire world. The mutual feedback loop of fear was broken because political leaders began to fear the generals and admirals who possessed such deadly toys more than they feared the rulers of foreign states.

On November 3rd, six days after the thermonuclear fireball spread across Bombay, the American President met with Soviet leaders in Moscow. The situation in Russia was desperate because of severe drought in the Ukraine and reduced harvests in almost all of the other 14 Soviet republics. The army's emergency food reserve was now being consumed by the civilian population, but it would be exhausted within 30 days. If some foreign source of food could not be found, then millions of Soviet citizens would die of starvation before spring.

On the morning of the first meeting, the Soviet Chairman surprised his American guest by candidly telling him that he was generally familiar with the details of "Project Abraham." A top secret U.S. Army program began in 1985, the ultimate goal of Project Abraham had been to store up to one year's supply of grain and canned food at remote sites that would not be likely nuclear targets in the event of war.

Army generals had convinced the handful of congressional leaders responsible for the funding of Project Abraham that . . . "in the 1980's, food

has become a decisive weapon." Their basic scenario was that nuclear weapons might not be extensively used in a major war, but plant diseases could be easily disseminated by "Ian Fleming type" enemy agents (the basic plot in one of the James Bond books). The side that first exhausted its food supply would lose the war—so reasoned the generals.

From 1985 until the summer of 1993, the army secretly accumulated its hoard of grain and preserved food (much of it freeze-dried). This program was carried out by a series of dummy or "cover" corporations in which army officers secretly passed themselves off as civilian businessmen. Select groups within the Department of Agriculture participated in this clandestine operation by underreporting U.S. food production levels. Funds for Project Abraham were skillfully hidden in many sections of the annual Defense Department budget—an exceedingly complex document fully understood by only a few specialists.

Canned and freeze-dried foods were stored in depleted mines, old warehouses and other sites that could be supplied by truck. Wheat, rice and soybeans presented problems because they could not be stored for a prolonged span of years. The army's cover companies had to engage in a constant pattern of buying new grain and selling some of the old grain in the Project Abraham reserves. They bought more grain than they sold each year, so this portion of the food mix grew at a pre-determined rate. But the buying-selling turnover requirements forced the army to store the grain in conventional facilities next to railroad lines or rivers deep enough for barge traffic.

The American President was told that photos from Russian reconnaissance satellites enabled Soviet intelligence specialists to make an accurate count of the slow buildup of grain elevators and similar facilities. They could calculate the approximate size of the Project Abraham reserves by starting with their satellite count and simply subtracting the number of grain storage facilities published each year in official Department of Agriculture reports. Well placed Russian spies had informed the Kremlin that, because of funding problems, there was not a significant quantity of canned and freeze dried food in the Project Abraham larder.

In an equally candid response, the President explained that Project Abraham reserves had been severely depleted during the past ten months. Some of this food had been sent to Mexico to prevent starvation, but much of it had been sold on the open market within the states to hold down rising food prices during a year of disastrous harvests throughout North America. This latter move was forced on the President by congressional leaders who faced an uncertain election in a few days.

By the end of the day, Project Abraham data from the Pentagon had been matched with estimates of projected Soviet food requirements for the next year. An exceedingly strict food rationing program throughout the U.S., accompanied by the prompt transfer of all of the remaining Project Abraham reserves to the U.S.S.R., could prevent starvation in that country. Food supplies were already severely curtailed in America, and new laws forbid feeding livestock any form of grain that could be di-

verted to human consumption.

That evening the President said: "The American people will make such a sacrifice if they can be convinced that it will enhance their own long-term security and survival. For the past 4 decades the citizens of both of our great countries have lived under the threat of a nuclear sword of Damocles. Both the Americans and your people want this dire threat removed. The principal barrier to this common goal has been the past refusal of Soviet leaders to allow on-site inspection by international teams monitoring arms-control agreements.

"I propose that all Soviet and American strategic missile systems, both land and sea, be dismantled or otherwise destroyed before the end of the year. Soviet teams in the U.S. can confirm our actions at the same time that American military specialists are monitoring events at missile sites and naval bases in this country.

"In summary, I suggest that we call this disarmament program 'Project Plowshare.' The Project Plowshare treaty could be signed within 48 hours, and then by executive presidential order reserve grain and food now held by the U.S. Army would be loaded as fast as possible on all available Soviet and American transport planes for immediate transfer to this country. Other phases of the disarmament program could be agreed upon in 1995."

After a long pause, the Soviet Chairman replied with obvious emotion: "Mr. President, we would agree to your magnanimous proposal without a minute's delay except for one problem of pivotal importance. Satellite photos reveal that China has

over 140 ICBM's with hydrogen-bomb warheads. The Peking leadership is so unstable that no one can now predict what course of action they might take. If we give up our nuclear shield, more lives would probably be lost through Chinese missile strikes on our cities than could possibly be lost to starvation. But we will sign the Project Plowshare treaty the very moment we are convinced that China will concurrently be stripped of its long-range strategic missiles."

It was known to both the American and Soviet leaders that key members of China's new "collective leadership" were already in Tokyo attempting to acquire some of the grain the farsighted Japanese had stored on their home island during the past decade. By coincidence, the Shah of Iran was scheduled to arrive in Tokyo on a state visit to Japan on November 6th.

Early the next morning, on November 4th, the American Secretary of State and the Soviet Foreign Minister flew to Teheran and explained the details of their proposed Project Plowshare disarmament treaty to the Shah. He agreed with the objectives of the treaty, and promised to act as a "neutral friend of all parties" in recommending its adoption by the new Peking leadership as soon as a meeting with them could be arranged in Tokyo.

On November 6th reporters in Tokyo were surprised to learn that the official banquet to be hosted that evening by the Japanese Emperor had suddenly been cancelled because the Shah was "slightly indisposed." He had appeared in perfect health at the airport welcoming ceremony.

That evening, the Shah and Japan's Prime Minister met with the new Peking leaders. The

thermonuclear devastation of Bombay nine days earlier had created a climate of unprecedented tension—fear that the final holocaust was near at hand. The heated discussions lasted all night, but as the first rays of light broke over the land of the rising sun, the Chinese finally agreed to meet as quickly as possible with American and Soviet leaders. The site of that meeting was a question requiring face saving compromise.

Iran enjoyed good relations with China, Japan, the U.S.S.R., and the U.S. Following "hot line" communications with American and Soviet leaders in Moscow, it was decided to accept the Shah's invitation to hold the conference in Teheran. Iran's grain gifts to Pakistan were preventing starvation in that country, enhancing the Shah's prestige in matters related to the world food crisis.

On November 8th, the Chinese and Japanese delegations flew with the Shah in his Air Iran Concord SST to Teheran. Fifteen minutes after their arrival, a Tu 144 SST carrying the Soviet and American leaders landed at the same airport. The first formal meeting between the leaders of the participating world powers was held at the Shah's palace that evening.

Following three days of discussion, agreement was reached on the details of the Project Plow-share treaty. One problem had been that the Peking leaders held only a tenuous control over the provinces in China where their ICBM's were located. It appeared that a continuing air supply of Japanese grain sent directly to these provinces might not be a sufficient inducement to cooperate for the generals commanding the six key ICBM complexes. But these generals would cooperate if

they were also given substantial quantities of gold bullion that would allow them to continue to acquire grain or other items on the world markets during the next few years. Consequently, it was agreed that the U.S. and U.S.S.R. would both donate \$6 billion worth of gold bullion—\$2 billion in gold bullion to be flown with rice and wheat to each Chinese general as joint Soviet-American teams witnessed the dismantling and demolition of the Chinese ICBM complexes.

On November 12th, the American, Soviet, Chinese and Japanese leaders flew with the Shah to the ruins of Persepolis which had been the capitol of the ancient Persian Empire. The Project Plowshare treaty was signed in lavish tents set up in the middle of the ruins—an ideal site for the televised event. During the next few hours the peoples of the world were given renewed hope as their TV sets presented live coverage of a banquet at which the leaders of each participating nation gave speeches pledging to do everything in their power to guarantee the treaty objectives of disarmament and perpetual peace.

Within a few days, joint inspection teams were witnessing the dismantling of ICBM's in China, the Soviet Union and the U.S. England and France had also agreed to destroy their long-range strategic nuclear weapons. Fleet ballistic submarines were arriving at designated ports where their deadly missiles were removed from the launching tubes. These submarines would be converted to scrap metal as soon as possible.

On December 31st, you gather with family and friends in your living room and watch the live TV coverage of the last of the ICBM missile silos being

blown up in Siberia and Montana. During the New Year's Eve party that night someone mentions that . . . "we are all acting like persons condemned to the gas chamber who have unexpectedly been given a complete pardon."

Thus ends the most catastrophic year in human history. But out of the ashes of Bombay and the suffering of countless people dying of starvation had come some positive evidence that sanity would prevail over the apocalyptic forces of chaos and doom. Many more would die before the global famine ended, but we are now entering a new era in which the arms race has been completely abandoned as an anachronism.

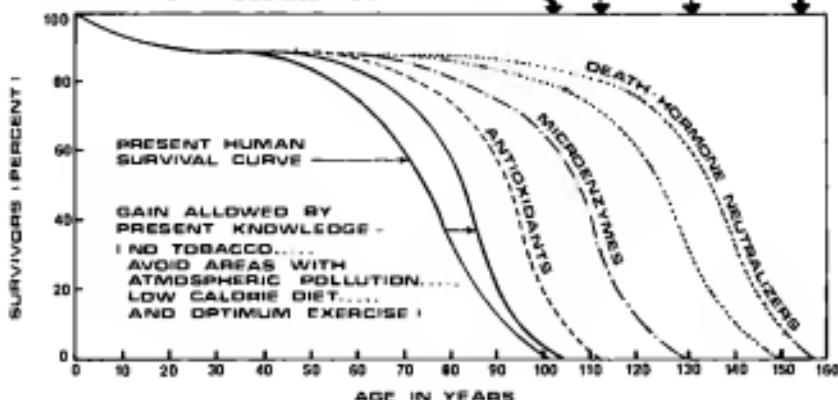
2014: METHUSELAH'S CHILDREN

Thirty-five years have passed since 1979. However, your vitality and mental alertness have not declined appreciably during the past three decades. In fact your youthful appearance would have been astounding one or two generations ago. The reason for your vigor and comparative youthfulness is that you have been the beneficiary of a series of revolutionary breakthroughs in aging-retardation which first reached the stage of widespread clinical availability in the early 1980's.

During a rainy weekend in March, you read *Methuselah's Children*, a 1958 science fiction book by Robert A. Heinlein which reviewed the impact on society of a group of people with greatly extended lifespans. This group achieved their remarkable longevity through the selective breeding

POSSIBLE HUMAN SURVIVAL CURVES

1995 UNCERTAIN
1990 PROBABLE
1980 HIGHLY PROBABLE
1977 POSSIBLE TODAY



of individuals from long-lived families. They enjoyed greatly extended youth, but less fortunate humans were hostile, and eventually their very existence caused society to undertake a massive research program which culminated in a successful means of rejuvenation. You conclude that the outcome of this fictional forecast is plausible because, in Heinlein's words, such youthful longevity would be . . . "the greatest boon it is possible for a man to imagine."

Your personal physician's office is a short walk from your Micropolis-near-the-sea home. He divides his time between his private practice and half-time duties as director of a gerontology research institute associated with the local college. During an office visit, you mention Heinlein's 56-year-old novel. The expression of fatigue on his face immediately disappears.

"Lazarus Long, the central character in *Methuselah's Children*, is my favorite fictional character. You must read *Time Enough For Love*, which covers his adventures during the subsequent two thousand years of his life. I suppose that old Lazarus appeals to me because my professional career has been divided between research efforts to extend the youthful portion of the human lifespan and a restricted medical practice in which I can observe the clinical applications of aging-retardation therapies. What gerontologists have accomplished during the past three or four decades is a fascinating part of recent history—one that will have an incredible impact on the future. Stop by after office hours each evening during the next few days, and I will try to summarize it for you."

Walking to your physician's office the next afternoon, you reflect on the fact that for many years you have been receiving various treatments extending your lifespan without asking any questions about them. Now this deficiency in your bank of knowledge will be corrected. Upon your arrival, he pours glasses of wine for the two of you and begins his fascinating story—man's quest for the fountain of youth turned into reality.

"Prior to the 1980's, clinical medicine was directed toward the elimination of suffering through the amelioration of disease. As one disease after another was controlled, as infant mortality further diminished, life expectancy reached about seventy years. This plateau proved unassailable until an insight was gained into the aging process itself by the pioneer gerontologists (scientists who explore the biological aspects of aging).

"Most of our national medical expenditures were then being spent on the afflictions of senescence, heart disease, stroke and cancer, and research efforts to cure these diseases in people already old were painfully disappointing. The gerontologists' goal was to defeat the diseases of the elderly by defeating the afflictions of old age *en masse*—by extending the longevity of the body's natural defense system against these degenerative diseases. And during the past 35 years our approach has been successful.

"Let me explain this progress by reviewing the aging-retardation treatments that you have been receiving for more than thirty years. Each one of them slows down a separate cause of aging providing better health and added years. But their effect is cumulative, and we have now reached the stage where we can almost bring the aging process to a standstill.

"We now know that there are several major (and many minor) causes of aging and related biological/mental decline. An aging theory has been presented for each of these causes of senescence, and today we have one or more aging-retardation therapies that favorably modify the pattern of biological change explained by most of these aging theories. In other words, we now have anti-aging treatments for some, but not all causes of mammalian senescence.

"Your medical records show that you began to take *antioxidants* in 1981. This therapy is based on the "free radical theory of aging"—first proposed by Denham Harman of the University of Nebraska. This theory partly explains aging as being caused by the harmful side effects of free radicals (highly

active fragments of molecules) which are produced in the course of normal metabolism, and by oxidation of the connective tissue. Free radicals initiate changes primarily by removing hydrogen atoms from biologically vital cellular components such as DNA.

"The pills you have been taking for the past 33 years contain a mix of natural antioxidants (Vitamin E, Vitamin C and the element selenium) and synthetic antioxidants that react with and neutralize free radicals before they can damage the vital molecules in our tissues. New synthetic antioxidants have been added to the mix over the years, and it appears that they can add between 12 and 18 years to the average lifespan—assuming that a person begins taking them at a relatively young age.

"In 1984, you began taking *microenzymes* in pill form. Here we have the famous "youth pill," a therapy based on the "cross-linkage theory of aging"—first proposed in 1941 by Johan Bjorksten who also isolated the microenzymes from soil bacteria during the 1970's. Bjorksten founded a research institute near Madison, Wisconsin. In his cross-linkage theory, aging is explained as being caused by a gradual, but progressive, chemical cross-linkage of large vital protein and nucleic acid molecules (DNA and RNA) within and around all the cells of the body. As time passes, our vital protein and nucleic acid molecules are bound together in pairs, and even larger aggregates, which are irreversibly immobilized. The resulting accumulation of this "frozen metabolic pool" clogs the cells, interferes with the functioning of the remaining free molecules, and ultimately destroys

the cells. "Microenzymes from soil bacteria are enzymes of such small size that they can reach and penetrate the tightly cross-linked aggregates formed as we age. These microenzymes are able to break down most of the cross-linked molecule groups so that they can be excreted from the cells, thereby freeing the space they occupied for the synthesis of new normal molecules.

"These youth pills also contain chemicals called 'chelation agents' which can remove cross-linkage caused by lead, cadmium and aluminum. The chelation agents attach themselves to these toxic metal atoms in a way that allows them to be excreted from the body. In recent years other chemicals that further reduce harmful cross-linked molecule groups in the body have been added to these pills.

"A conservative estimate of the lifespan gain of these "Bjorksten youth pills" is 20 to 30 additional years of youthful life. The gain might prove to be much higher because in recent years more effective microenzymes have been added to the pills. We will know what additional benefits they may allow in a few years. I should also mention that free radicals are the most powerful cross-linking agents in the body, so the antioxidant pills you have been taking help to prevent the initial formation of cross-linked molecules.

"In 1987, you began receiving weekly injections of a hormone called 'thymosin,' which helps to restore and maintain the body's vital immunological system, thereby increasing resistance to all kinds of infections, to cancer, and to the deteriorative changes that were associated with an advanced state of aging thirty years ago. It is uncer-

tain how many years, if any, thymosin injections may add to human lifespan, but the clinical availability of thymosin has made the added years of people on aging-retardation programs much more healthy and disease-free than they would otherwise be. Allan L. Goldstein, one of the two scientists who discovered thymosin, was correct when he predicted in the 1970's that it would open the door to the conquest of many diseases which were then thought to be incurable.

"Your medical records show that from time to time you have received *plasmapheresis* treatments. In 1923, Alexis Carrel (1873-1944) proposed that our blood accumulates toxins which contribute to aging. In the 1980's a New York physician, Norman Orentreich, perfected the plasmapheresis procedure, a technique in which blood is withdrawn and the red blood cells are separated from the plasma which is discarded. The blood cells are then mixed with a synthetic plasma and returned to the human from which they were taken. It is assumed that the body produces new blood protein molecules that will not cause the damage of those removed through plasmapheresis.

"Since plasmapheresis treatments are exceedingly expensive, we do not have sufficient clinical data to determine if they allow any added years, but I am convinced that they promote better health and youthful vitality.

"You may recall that Heinlein described a procedure almost identical to plasmapheresis in *Methuselah's Children*, a remarkable forecast for a year as early as 1958. His words explaining a 'rejuvenation process' were: 'It consists largely of replacing the entire blood tissue in an old person

with new young blood. Old age, so they tell me, is primarily a matter of the progressive accumulation of the waste products of metabolism. The blood is supposed to carry them away, but presently the blood gets so clogged with the poisons that the scavenging process doesn't take place properly.'

"In 1995, you began receiving injections of '*death-hormone neutralizer*' every third day. During the early 1980's, W. Donner Denckla of Harvard University proved that a hormone, called '*death hormone*' in the popular media, is produced by the pituitary gland at the base of the brain. Death-hormone molecules act at the surface of the cell membranes to keep thyroxine out of all of our body cells. Thyroxine is a vitally important hormone produced by the thyroid gland. A diminished supply of thyroxine within the cells causes many of the changes and various forms of biological damage that we associate with senescence.

"Denckla was able to demonstrate that the production of death-hormone begins when we are in our early 20's, and then increases rather slowly until we reach a critical point in the life cycle which can range between 55 and 85. At this point the output of death-hormone increases dramatically, and thereby speeds the rate of aging so that in a few years the body is so weakened that any minor stress can cause death.

"Within five years Denckla was able to synthesize a neutralizer drug which blocks the action of death-hormone, thereby reversing a major cause of aging. This death-hormone neutralizer allows an additional 20 to 30 years to be added to the

lifespan. Like the benefits of microenzymes, death-hormone neutralizer has a rejuvenating effect on all of our cells.

"Your records do not indicate that you have received any other anti-aging therapies during the past 33 years. Do you have any questions on those I have described?"

"I would like to have some idea of what the cumulative lifespan gains might be. What is the prospect for new aging-retardation breakthroughs? Will true rejuvenation ever be possible?"

Your physician places a cardboard graph on an empty chair. (See graph on page 304.) "This graph should give you an idea of the multiple advances made by gerontologists during the past four decades. You have been my patient for quite a few years now, and I have kept you on a near-optimum aging-retardation program. The cumulative effect of these therapies now allows you to enjoy much better health and vitality than you had before moving to this Micropolis community. As the chart demonstrates, together they represent a powerful arsenal, which, carefully used, has enabled us to extend decisively your specific lifespan.

"And I have every reason to believe that you will be the beneficiary of new means of extending youth that are still in the research stage. For example, Bernard L. Strehler of the University of Southern California long ago proved that senescence is partly caused by a 'molecular-genetic breakdown' in which the DNA molecules of aging cells cannot produce the correct RNA molecules which in turn must produce the enzymes and

other vital components of tissues.

"Within the next four months you will begin receiving new injections that will correct the cause of aging discovered by Strehler. This will be accomplished through genetic engineering via liposomes—a technique which holds the key to the rejuvenation of all of our cells except for brain and nerve cells. The liposome is a tiny onion-like cellular component made up of concentric lipid bilayers alternating with aqueous compartments, within which soluble substances can be entrapped. Recent research demonstrates that liposomes provide an ideal means of transporting artificial genes (combinations of DNA) and other biological substances into our cells. The first liposomes entering your cells will release substances that will correct any adverse genetic repression of the DNA molecules. Thus you will experience rejuvenation at the cellular level.

"You would have to have a professional education in molecular genetics to understand some of the other approaches to aging-retardation now in the research stage, but I expect that the rate of scientific progress in gerontology will become so rapid that you should enjoy a series of new life-extending bonuses. Collectively, they will permit a degree of biological improvement that would have been called 'rejuvenation' in the past. Rejuvenation is a semantically loaded word, and gerontologists avoid its use.

"Already we can see that the added years of mental vigor and physical vitality is providing society with increased productivity in science, the arts and in every other field. The reason is simple. Few professionals are really productive until they

are thirty. The preceding years of education and apprentice status are a drain on society. When most people retired in their sixties, the years spent being educated to years productively working was about a 1 to 1 ratio. Now that 150-year lifespans are feasible, the productive years can be extended to age 90 or even 120—education to productivity ratios of 1 to 2 and 1 to 3. I expect scientific advances to eventually permit a 300-year lifespan. Education to productivity ratios of 1 to 6 or 1 to 8 could then be realized.

The painfully accumulated knowledge of a talented person is our greatest loss when it is removed by death or senility. In the past centuries, there was probably very little true wisdom because many decades of experience are necessary for its formation. A wise population of supercentenarians can now undertake projects undreamed of before the breakthroughs in aging control. Multidisciplinary training with Ph. D. levels of education in several fields is now becoming a feasible standard. Only youthful longevity allows man to fully exploit the mental resources of the human brain.

“I am rambling on a bit, and you seem to have a somewhat perplexed expression on your face.”

“Well doctor, all that you have said causes me to wonder what will happen if all causes of aging are fully understood and found curable. There would then be no natural term to life. All death would be by accident or intent, for in a sense death by a disease which is well understood and not normally fatal is an accident as much as death in an automobile crash.

“Will gerontology research culminate in an age

of permanent youth where people have indefinitely extended lifespans? I would imagine that the widespread availability of permanent youth could result in an unprecedented population crisis. What are the foreseeable solutions to this problem?"

"You must keep in mind that, like plasmapheresis today, some future aging-retardation or rejuvenation treatments may be so expensive that they will not spread quickly throughout society. And the prospects for an 'indefinite lifespan' are uncertain. At the present time gerontologists have been able to propose solutions to all known causes of aging except for one vital area—the slow loss of those brain cells (neurons) which do not divide after birth. If some means could be devised to make these cells divide, the process of aging would not confront a 'brain barrier,' and *Methuselan* lifespans significantly greater than one thousand years might be possible.

"Even if the replacement of brain neurons is not achieved, exceedingly long lifespans are probable. Thirty-eight years ago, Donner Denckla predicted that: 'in the next century . . . expected lifespan will go up to 200, 300 or even 400 years.'

"Consequently, gerontologists have given a great deal of thought to the prospective population growth problem that troubles you. There is one possible answer that has been given considerable attention in our journals. It is called 'Plan Alpha.'

In Plan Alpha, every man and woman would be legally restricted to being the parent of one living child free from serious mental or physical defects. This right would extend to being the ancestor of a single line of descendants expected from the

child's offspring, generation by generation into the future.

"This table shows you what present and future birthrate patterns would have been if Plan Alpha had been adopted on a global basis 14 years ago at the turn of the century:

<i>Time Period</i>	<i>Number of Births</i>
2000-2025	2,000,000,000
2025-2050	1,000,000,000
2050-2075	500,000,000
2075-2100	250,000,000
2100-2125	125,000,000
2125-2150	62,500,000
2150-2175	31,250,000
2175-2200	15,625,000
2200-2225	7,812,500
2225-2250	3,906,000
2250-2275	1,953,000
2275-2300	977,000
2300-2325	488,000
2325-2350	244,000
2350-2375	122,000

"You can see how Plan Alpha would allow total population size to be stabilized in an age of permanent youth.

"I would like to summarize one important feature of Plan Alpha. In this program, the death of anyone who had not become the parent of one child would eliminate the line of descendants for all of his or her ancestors who had participated in the program if he or she were not replaced. Advances in reproductive biology can now remove this area of uncertainty.

"We can now extract very small embryos from humans ten days after fertilization and store them in liquid nitrogen at minus 196 degrees C. Dimethyl sulphoxide, a cryoprotective 'antifreeze' chemical, prevents freezing damage and these embryos can remain in a state of suspended animation for an indefinite time if a low enough temperature is maintained. When removed from cryogenic storage, they can be thawed out in a process that removes the chemical preservative. The embryos are then transferred to the uteri of 'host' mothers where normal embryonic development resumes. Normal children are born without any discernible defects.

"Several months following a Plan Alpha birth, the new mother would be given a hormone injection that will normally cause multiple births. A carefully timed number of days after fertilization, the developing embryos would be surgically removed and put into suspended animation. This procedure might be repeated one or two more times, and if the child appeared normal at its first birthday, both parents would then be sterilized. If the three-member family were killed in an auto accident several years later, one embryo could be brought to term in a host mother. This replacement child would provide a living descendant for the four grandparents, maintaining their right to continuation in the stream of human history.

"Other situations would also justify reanimation of the frozen embryos. Any young adult who decided to bypass parenthood could be sterilized. One of his frozen embryonic brothers or sisters is then brought to term in a host mother providing his parents with another descendant who would

probably have a child. This same procedure could be followed where any adult proved to be sterile.

"We scientists can now predict with a fair degree of accuracy what will be possible, but the precise policies, laws and corrective measures that will be taken in the future lie outside the range of my crystal ball. In any event, I believe that a birthrate reduction program very similar to Plan Alpha will eventually be adopted."

"Doctor, aside from Plan Alpha, what other changes do you foresee if the prospect for permanent youth is realized?"

"There would probably be an extension of patterns already emerging at this time—the age of extended youth. We can already see a decreased tendency for people to marry partners who are about the same age chronologically, an increase in what were once called 'May-December' marriages.

"Perhaps marriage as we have known it in the past will not be compatible with an age of permanent youth. Already a new sexual ethic appears to be forming in which people regulate their lives in conformity with bodily needs rather than restrictive social requirements. Perhaps through rational inquiry and bold experimentation we can reduce the unnecessary suffering of existence and give ourselves a fuller share of the pleasures of life, particularly the sensuous ones.

"The Methuselan Age will open up prospects for the individual that can only be dimly foreseen today. For almost any project, time would no longer be a constraint. The complete conquest of aging, if it is realized, will certainly be viewed as the most momentous achievement in the history of science."

A NOTE TO OUR READERS

You will doubtless have noted that the cover price on this the second issue of DESTINIES is \$2.25. This is due to the fact that the only supplier of the particular grade of paper used in DESTINIES #1 is undergoing a strike. We were left with three options: use ordinary newsprint; delay publication; go to an even higher grade of paper. The first option was deemed unacceptable, the second even less so. We don't like the third option much either—and we're sure you don't—but we honestly believe it's the best available. By the way: assuming the same level of sale our profit margin remains virtually unchanged.

WE INVITE LETTERS

Almost since the Beginning science fiction magazines have carried letter columns. At their worst, they are nothing but paeans of exaggerated praise for the magazine and its Editor—oddly enough, the worse the magazine, the more unreserved the praise. At their best these columns are treasure troves of insight and wit, and a dash of brimstone for flavor.

Obviously we want the latter kind for DESTINIES—but for that we need *you*. Subject matter is open: the only requirement is that you feel strongly; if you do, chances are your fellow readers will too. If you have something to say, now you have a place to say it. Right here, write now!

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